

AD-A155 634

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
MUDDY COVE POND DAM (..U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV NOV 79

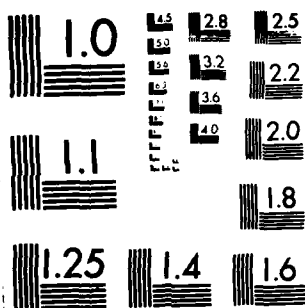
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AD-A155 634

TAUNTON RIVER BASIN
DIGHTON, MASSACHUSETTS

MUDDY COVE POND DAM
MA 00793

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
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NOVEMBER 1979

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MUDDY COVE POND DAM
MA 00793

TAUTON RIVER BASIN
DIGHTON, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Identification: MA 00793
Name of Dam: MUDDY COVE POND DAM
Town: DIGHTON
County and State: Bristol County, MA
Stream: Muddy Cove Brook
Date of Inspection: 10 September 1979

BRIEF ASSESSMENT

Muddy Cove Pond Dam is approximately 985 feet long including the spillway and has a maximum height of approximately 32 feet. It consists of an embankment with riprap wave protection on the upstream face and a loamed and seeded crest and downstream face. A gatehouse is present at the left spillway abutment on the crest of the dam. The spillway is located approximately two thirds of the distance across the dam from the left abutment.

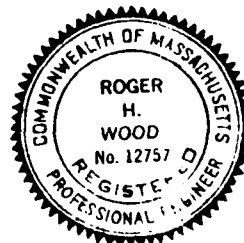
The facility is considered in good condition. There are no obvious signs of impending failure or conditions which would warrant urgent remedial measures.

Based on the size classification, small, and hazard potential classification, high, in accordance with Corps of Engineers Guidelines, the spillway test flood is the 1/2 Probable Maximum Flood. Hydrologic/hydraulic analysis indicates that the spillway capacity with the water surface at the top of the spillway abutments is approximately 2,120 cfs, which is about twice the routed test flood outflow of 1,100 cfs.* The estimated test flood stage is about 2.7 feet below the spillway abutments.

An investigation is recommended to evaluate the observed seepage at the toe of the dam embankment. Recommended remedial measures include the removal of brush from riprap and along spillway walls, restoration of eroded areas along spillway walls and gatehouse, filling of animal burrows, the monitoring of riprap erosion and seepage at embankment toe, and maintenance of the gatehouse door and reservoir sluice gate. The Owner should develop a formal maintenance program, operational procedure, and emergency preparedness plan and should institute a program of biennial technical inspections. The remedial measures and recommendations should be performed within two years of receipt of this report by the Owner.

CAMP DRESSER & MCKEE INC.

Roger H. Wood
Roger H. Wood
Vice President



PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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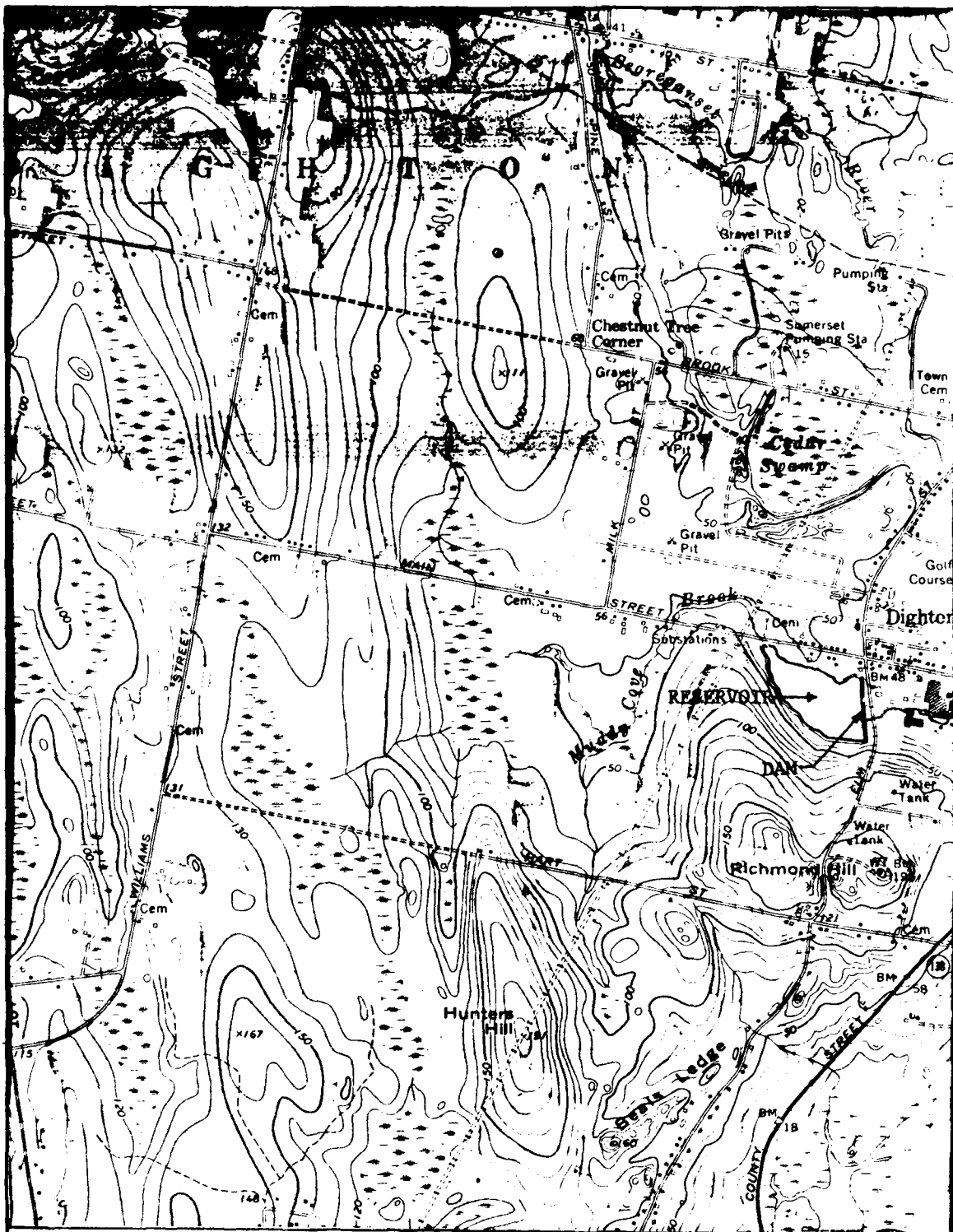
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1. OVERVIEW OF DAM AND RESERVOIR.



DAM MUDDY COVE POND DAM

IDENTIFICATION NO. MA 00793



LOCATION MAP
USGS QUADRANGLE

SOMERSET, MASS

APPROX. SCALE: 1" = 2000'

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

MUDDY COVE POND DAM

MA 00793

SECTION 1: PROJECT INFORMATION

1.1 General

- a. Authority - Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Camp Dresser & McKee Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Contract No. DACW 33-79-C-0053 was issued to Camp Dresser & McKee Inc. on 27 March 1979, by Colonel John P. Chandler, Corps of Engineers. Contract Modification No. P 00001 dated 24 August 1979 was subsequently issued by Colonel William E. Hodgson, Jr. Corps of Engineers. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee, Inc. for the soils and geological portions of the work.

- b. Purpose - The primary purpose of the investigation is to:
- (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
 - (2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal Dams.
 - (3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

- a. Location - Muddy Cove Pond Dam is located on the west side of Elm Street between Hart Street and Main Street in the Town of Dighton, Massachusetts, as shown on the report's Location Map. The dam impounds the waters of Muddy Cove Brook to form Muddy Cove Pond. Muddy Cove Brook flows from the dam to the Taunton

River, a distance of approximately 0.5 miles. The coordinates for the dam are 41 degrees 48.8 minutes latitude and 71 degrees 07.8 minutes longitude.

- b. Description of Dam and Appurtenances - Muddy Cove Pond Dam consists of an earth embankment with a reinforced concrete spillway and outlet works structure. The general layout of the dam and appurtenances is shown on the sketch, page C-1.

The embankment extends approximately 320 feet right and 635 feet left of the spillway structure. The embankment maximum height is about 32 feet and it has a crest width of 16 feet. The design drawings indicate the embankment consists of an impervious clay core, with gravel shells. Side slopes are 3H to 1V upstream and 2H to 1V downstream. Riprap protection on the upstream slope extends to within about 6 feet of the crest elevation.

The reinforced concrete spillway is near the center of the dam. It has a 30 ft. wide broad crested weir discharging onto a concrete cascade. At the bottom of the cascade, the discharged water flows through an 11.5 ft. wide by 7 ft. high concrete channel passing under Elm Street until it joins the original channel of Muddy Cove Brook. A metal horizontal bar rack is positioned across the channel in this area to prevent trespass along the channel bottom. The spillway, in general, is fenced and formerly contained barbed wire across its entrance also to prevent trespass. Within the fenced area and immediately adjacent to the left sidewall of the spillway, there is a gatehouse for the outlet works. One of the intakes for the structure is through the spillway left sidewall while the other is an intake tower in the reservoir. A 16 inch pipe and a 36 inch pipe leave the gatehouse.

The reservoir drain consists of a 36-in C.I. pipe with a submerged concrete intake tower located about 280 ft. out in the pond and controlled by a 36-in. sluice gate which is operated from within the gatehouse located on the crest of the dam. The 36-in. drain is about 690 ft. in length and discharges to Muddy Cove Brook, downstream of Elm Street, through a concrete headwall.

- c. Size Classification - The maximum height of the dam is approximately 32 feet and the estimated total storage capacity at the top of the dam is 432 acre-feet. According to Guidelines established by the Corps of Engineers, the dam is classified in the "small" category based both storage capacity and height.
- d. Hazard Classification - The results of the dam failure analysis indicate that the ICI Americas Inc. chemical manufacturing complex would be affected by the flood wave and the potential loss of life would be more than a few. Consequently, the dam is classified in the "high" hazard category.

- e. Ownership - The dam is owned by ICI Americas Inc, Dighton Works, 333 Main Street, Dighton, MA 02715. The owner is represented by Mr. A.W. Horlbeck, Plant Manager (Phone: 617/669-6731). The prior owner, Arnold Hoffman & Co, Inc. was bought by ICI America Inc..
- f. Operator - Mr. Hans Paulsen, Site Engineering Manager, is assigned the responsibility for operation of the dam. His business address is ICI Americas Inc., 333 Main St., Dighton, MA 02715. Phone: 617/669-6731.
- g. Purpose of the Dam - Muddy Cove Pond Dam provides for water storage. The water is pumped to a storage tank where it is used for cooling and process water by a manufacturer. A small portion of the cooling water is returned to the reservoir via a 12-in. CI. pipe outletting near the right abutment of the dam.
- h. Design and Construction History - Design drawings dated February 1948 indicate that the designer was Jenks & Ballou, Consulting Engineers. The photographs detailing the construction of the dam indicate that the concrete spillway and outlet works were begun in July 1949 and that work on the earth embankments was completed in December 1950. The contractor was Rocco Zoppo.
- i. Normal Operating Procedure - The grass is cut on a regular basis at the dam. Water is withdrawn through a 16-in. CI pipe and pumped to a storage tank for use by the Owner. A 36-in CI gated reservoir drain is operated from the gate house on the crest of the dam and is normally closed.

1.3 Pertinent Data - Elevations given in this report are on an assumed datum used for the design drawings. The Massachusetts DPW conducted a field survey of the dam on January 6, 1976 and determined that 90.6 ft. should be deducted from the local datum elevations to convert to National Geodetic Vertical Datum (NGVD), formerly referred to as Mean Sea Level Datum.

- a. Drainage Area - The drainage area tributary to the dam site is 2.76 square miles. Muddy Cove Pond accounts for approximately 1.4 percent of the total drainage area. The watershed is sparsely developed, moderately forested, and has substantial marsh areas.
- b. Discharge at Dam Site - There are no records of discharges at the dam site. A Bristol County inspection report dated January 12, 1959 reports approximately 3 ft. head thru spillway during 1955 flood with the gate valve closed which is an estimated discharge of 450 cfs.
 - (1) Outlet works size: 36 inch reservoir drain and 16 inch transmission line to pumping station. Drain capacity is approx. 120 cfs at spillway crest.
 - (2) Maximum known flood at damsite approx. 450 cfs in 1955.

- (3) Ungated spillway capacity at top of dam: 2,120 cfs @ 129.0 elev.
- (4) Ungated spillway capacity at test flood elevation: 1,100 cfs. @ 126.3 elev.
- (5) Gated spillway capacity at normal pool elevation . . .N/A
- (6) Gated spillway capacity at test flood elevation . . . N/A
- (7) Total spillway capacity at test flood elevation: 1,100 cfs @ 126.3 elev.
- (8) Total project discharge at test flood elevation: 1100 cfs @ 126.3 elev.

c. Elevation (ft. above Local Datum)

- (1) Streambed at centerline of dam 98.5
- (2) Test flood tailwater 106.0
- (3) Upstream portal invert diversion tunnel N/A
- (4) Normal pool 121.0
- (5) Full flood control pool N/A
- (6) Spillway crest 121.0
- (7) Design surcharge (Original Design) Unknown
- (8) Top of dam . . 129.0 at abutments and 130.5 between abutments.
- (9) Test flood 126.3

d. Reservoir

- (1) Length of test flood pool 3,500 ft.
- (2) Length of normal pool 2,250 ft.
- (3) Length of flood control pool N/A

e. Storage (Acre-ft.)

- (1) Normal pool 164
- (2) Flood control pool N/A
- (3) Spillway crest pool 164

- (4) Top of dam432
- (5) Test flood pool342

f. Reservoir Surface (acres)

- (1) Normal pool24
- (2) Flood-control poolN/A
- (3) Spillway Crest24
- (4) Test flood pool40

g. Dam

- (1) Type Earth embankment
- (2) Length 985 ft.
(incl. spillway)
- (3) Height 32 ft.
- (4) Top width 16 ft.
- (5) Side slopes. 3H to 1V U/S and 2H to 1V D/S
- (6) Zoning Central clay core with gravel shells
- (7) Impervious Core Compacted clay core
- (8) Cutoff Clay-filled cutoff trench
- (9) Grout Curtain None

h. Diversion and Regulating Tunnel None

i. Spillway

- (1) Type Concrete broad crested weir with cascade
- (2) Length of weir 30 ft.
- (3) Crest elevation 121.0
- (4) Gates None
- (5) U/S Channel 30 ft. wide approach between concrete wing-walls with 19 ft. depth at spillway crest.

- j. Regulating Outlets - The regulating outlet for this structure consists of a 36-in. C.I. gated reservoir drain which is operated from the gatehouse located on the crest of the dam. The 36-in pipe is approximately 690 ft. long having a submerged inlet located about 280 ft. upstream of the dam and a free discharge into Muddy Cove Brook downstream of Elm Street. In addition to the 36-in reservoir drain there is a gated 16-in. C.I. transmission main which flows to a pumping station located downstream of the dam. While the 16-in line is gated within the dam gatehouse, it is normally regulated at the pumping station.

SECTION 2: ENGINEERING DATA

- 2.1 Design Records - Design data in the form of plans and specifications dated February 1948 and February 20, 1950 respectively, were located and are indexed in Appendix B.
- 2.2 Construction Records - Construction records in the form of job photographs for this project are located at the engineering office of ICI Americas Inc., 333 Main Street, Dighton, MA 02715.
- 2.3 Operation Records - No operation records other than State and County inspection reports on the facility were located.
- 2.4 Evaluation
 - a. Availability - Documents described above are available at the engineering office of ICI Americas Inc, 333 Main Street, Dighton, MA 02715.
 - b. Validity - The design drawings were in general agreement with observed conditions although the following discrepancies were noted: Spillway height from toe to crest is shown as 18 ft. vs. 19 ft. as measured in the field, freeboard height from spillway crest to top of abutments is shown as 9 ft. vs. 8 ft. as measured and plans indicate the top of the earth embankment to be level with the top of spillway abutments while field measurements found the top of embankments to be 1.5 ft. higher than the abutments. It appears that the spillway crest was raised 1.0 ft. during construction and that an additional 1.5 ft. height was added to the embankments, possibly for settlement allowance.
 - c. Adequacy - The available data, in combination with the visual examination described in the following section, is adequate for the purpose of the Phase I investigation.

SECTION 3: VISUAL INSPECTION

3.1 Findings

- a. General - The Phase 1 visual inspection of the Muddy Cove Pond dam was conducted on 10 September 1979.

In general, the earth embankment and spillway were observed to be in good condition. The outlet works gatehouse interior could not be observed as the lock mechanism on the door was not operable. The reservoir water level at the time of the inspection was at spillway crest elevation. The mowed grass on the dam facilitated the inspection.

Visual inspection check lists for the site visit are included in Appendix A and selected photographs are given in Appendix C.

- b. Dam - The spillway and earth embankment appears to be in good condition, based on the visual observations outlined by the following remarks:

- (1) The visible portion of the upstream slope has riprap consisting of cobbles to 3 foot size stones, extending to within about 6 feet of crest elevation. The riprap appears to be in good condition except where a few stones have been dislodged immediately adjacent to the spillway walls. There are some weeds growing among the riprap stones as shown in Photo 3. There is some erosion noticeable along the spillway walls and along the left abutment.
- (2) The crest has a good grass cover, as shown by Photo 4. The crest elevation is about 1.5 feet above the top of the spillway training walls. Available plans indicate that this difference in elevation may result from placement of extra fill as a "shrinkage and settlement allowance". Some erosion was noted around the gatehouse. There is an abandoned telephone or electric pole on the crest, near the left end.
- (3) The downstream slope has a good grass cover, as shown by Photo 2. There is a small amount of brush at the toe, next to the spillway. Some slight erosion was noticeable along the spillway training walls. An abandoned animal burrow was noted 65 feet right of the spillway, about half way up the slope.
- (4) The area between Elm Street and the right embankment toe, within about 150 feet of the spillway, was wet and soft. There was some standing water in this area as shown by Photo 5. However, no water flow or evidence of soil movement was discernible. The area between the toe and the street on the left side of the spillway was somewhat soft but no evidence of seepage was noted.

- (5) The spillway was observed to be in good condition with only minor concrete spalls, joint deterioration and efflorescence noted. The spillway, cascade and discharge channel have no material obstructions present, only minor debris present in the channel. The horizontal bar rack at the end of the discharge channel may cause debris to collect and form an obstruction during high discharges.
- c. Appurtenant Structures - The lock mechanism on the gatehouse door was inoperable and the interior of the gatehouse was not accessible for inspection.
- d. Reservoir Area - Development adjacent to the reservoir is light and is limited to the northern shoreline. There appears to be no potential for landslides into the pond which could cause waves to overtop the dam. No conditions were noted which would result in a sudden increase in sediment load into the pond.
- e. Downstream Channel - The spillway discharge channel is a rectangular concrete channel 18 ft. wide by 7 ft. high at the toe of the spillway tapering to 11.5 ft wide by 7 ft. high downstream of Elm Street where it joins the natural channel of Muddy Cove Brook. The slope of the concrete channel is 0.025 with a 8.1 ft. clearance beneath Elm Street.
- 3.2 Evaluation - The dam appears to be in good condition, based on the visual observations described above. The evidence of apparent seepage noted at the embankment toe is not considered serious at this time. However, changes in the pattern or quantity of seepage could be significant relative to the continued satisfactory performance of the embankment. The lock mechanism on the gatehouse door should be repaired to allow access to the control valves.

SECTION 4: OPERATIONAL PROCEDURES

- 4.1 Procedures - In general, there is no formally established routine for the operation of the dam. The reservoir drain has not been recently operated to the knowledge of the present owners. The gate on the 16-in. process water line located within the gatehouse is normally open and flow is regulated at the downstream pumping station.
- 4.2 Maintenance of the Dam - There is no established formal maintenance program for this dam. The operator indicated that the grass is mowed on a regular basis and maintenance is performed on a demand basis.
- 4.3 Maintenance of Operating Facilities - Water is released from the reservoir as needed by the owner through the 16-in. pipe outlet. Maintenance of the outlet is performed on a need basis. The reservoir drain has not been operated for several years and its operating condition is unknown.
- 4.4 Description of Warning System in Effect - There is no established warning system or emergency preparedness plan in effect for this structure.
- 4.5 Evaluation - Maintenance of the facility is being performed on the basis of need. There is currently no formal operational procedures in effect for Muddy Cove Pond Dam. Formal operational procedures, maintenance programs, warning system and emergency preparedness plans should be established.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

- a. General - Muddy Cove Pond Dam is an earth dam located in the Town of Dighton, Massachusetts. The dam is approximately 985 ft. long including the spillway which is located near the center of the dam and has a hydraulic height of 27 feet. The spillway consists of a 30 ft. wide concrete broad crested weir with concrete sidewalls extending upwards 8 ft. from the wier. Water is withdrawn from the pond via a 16-in. C.I. pipe and is pumped to a holding tank for use as both process and cooling water. The pond has a water surface area of about 24 acres and a storage of 164 acre-feet at spillway crest elevation. The dam is essentially a high surcharge-low spillage facility which discharges to Muddy Cove Brook. The brook conveys the flow to the Taunton River, about 0.5 miles downstream.
- b. Design Data - There is no hydraulic/hydrologic design data available for the dam other than a reservoir stage-storage relationship chart.
- c. Experience Data - There are no records of past floods at the dam site. The most significant discharge, according to a January 1959 Bristol County inspection report, occurred in 1955 at an approximate head thru the spillway of 3 feet. Based on the spillway rating curve developed for this Phase I investigation, a 3 ft. head is equivalent to a spillway discharge of 450 cfs.
- d. Visual Observations - The visual inspection of the dam was made on 10 September 1979. At that time, the pond was at spillway crest elevation and zero discharge was occurring. Both the spillway and the discharge channel were in good hydraulic condition. There are no provisions for stoplogs or flashboards at the facility.
- e. Test Flood Analysis - Based on the Corps of Engineers Guidelines, the recommended test flood range for the size (small) and hazard potential (high) is 1/2 PMF to a full PMF (Probable Maximum Flood). The 1/2 PMF was adopted as the test flood and was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The watershed characteristics are typically those of Coastal drainage basins. A peak inflow rate of 450 csm was adopted for the 1/2 PMF which results in a test flood inflow of 1,250 cfs.

Surcharge storage routing of the test flood inflow resulted in a routed test flood outflow of 1100 cfs at a stage of 126.3 feet (or elevation 35.7 NGVD). At test flood stage, there is 2.7 ft. freeboard at the spillway walls and 4.2 ft. of freeboard relative to the top of the earth embankments. Therefore, the spillway is considered adequate to pass the routed test flood outflow.

- f. Dam Failure Analysis - Based on Corps of Engineers Guidelines for estimating Dam Failure Hydrographs, and assuming that a failure would occur along 40 percent of the mid-height length (208 feet) of the dam, the peak failure outflow is estimated to be 49,000 cfs. The ICI Americas Inc. manufacturing complex is located immediately downstream of the dam on a wide flood plain. Downstream of the plant is the Route 138 bridge followed by a railroad embankment and culvert. Analysis indicates that the railroad culvert has insufficient capacity to convey a dam failure outflow and that the railroad embankment would be overtopped as well as Route 138. As a result of a dam failure, the ICI Americas Inc. manufacturing complex would be inundated by about 10 ft. of water and the potential loss of life would be more than a few persons. Economic damages would be very high.

Based on the potential loss of life and property resulting from a failure of Muddy Cove Pond Dam, the dam is classified in the "high" hazard category.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

- a. Visual Observations - No evidence of embankment instability was noted during the site examination on 10 September 1979. Evidence of apparent seepage is not, at this time, considered to be significant relative to embankment stability.
- b. Design and Construction Data - Contract specifications, design drawings and well-documented construction photographs were available from the owner. These records, in particular the photos, suggest that good construction methods were utilized. Based on a review of the available records, it is expected that the embankment should have an adequate margin of safety under static conditions.
- c. Operating Records - Except for the continued existence and apparently satisfactory performance of the embankment since construction, there are no known operating records other than State and County inspection reports to aid in the evaluation of structural stability.
- d. Post Construction Changes - There are no known modifications or post-construction changes which affect the dam's structural stability.
- e. Siesmic Stability - Muddy Cove Pond Dam is located within Siesmic Zone 2 and in accordance with the Guidelines does not warrant siesmic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition - Based on the visual examination and on the review of available records, the dam is considered to be in good condition. While some evidence of apparent seepage was noted, no conditions which would require urgent remedial action was observed. However, the lock mechanism of the gatehouse door was jammed precluding access to and inspection of the control gates.
- b. Adequacy of Information - The evaluation of the facility has been based primarily on the visual examination, consideration of available documents and past performance and application of engineering judgement. Generally, the information available or obtained was adequate for the purposes of the Phase 1 assessment. However, it is recommended that additional information relative to embankment seepage be obtained as outlined in Section 7.2.
- c. Urgency - The recommendations for an additional investigation and remedial measures, outlined in Sections 7.2 and 7.3 respectively, should be undertaken by the Owner within two years after receipt of this report.
- d. Need for Additional Investigation - An additional investigation should be performed as outlined in Section 7.2.

7.2 Recommendations

It is recommended that the Owner arrange for the following investigation to be made by a registered professional engineer:

- (1) Evaluate the significance of the observed evidence of seepage with respect to long-term embankment stability and assess the need for remedial measures.

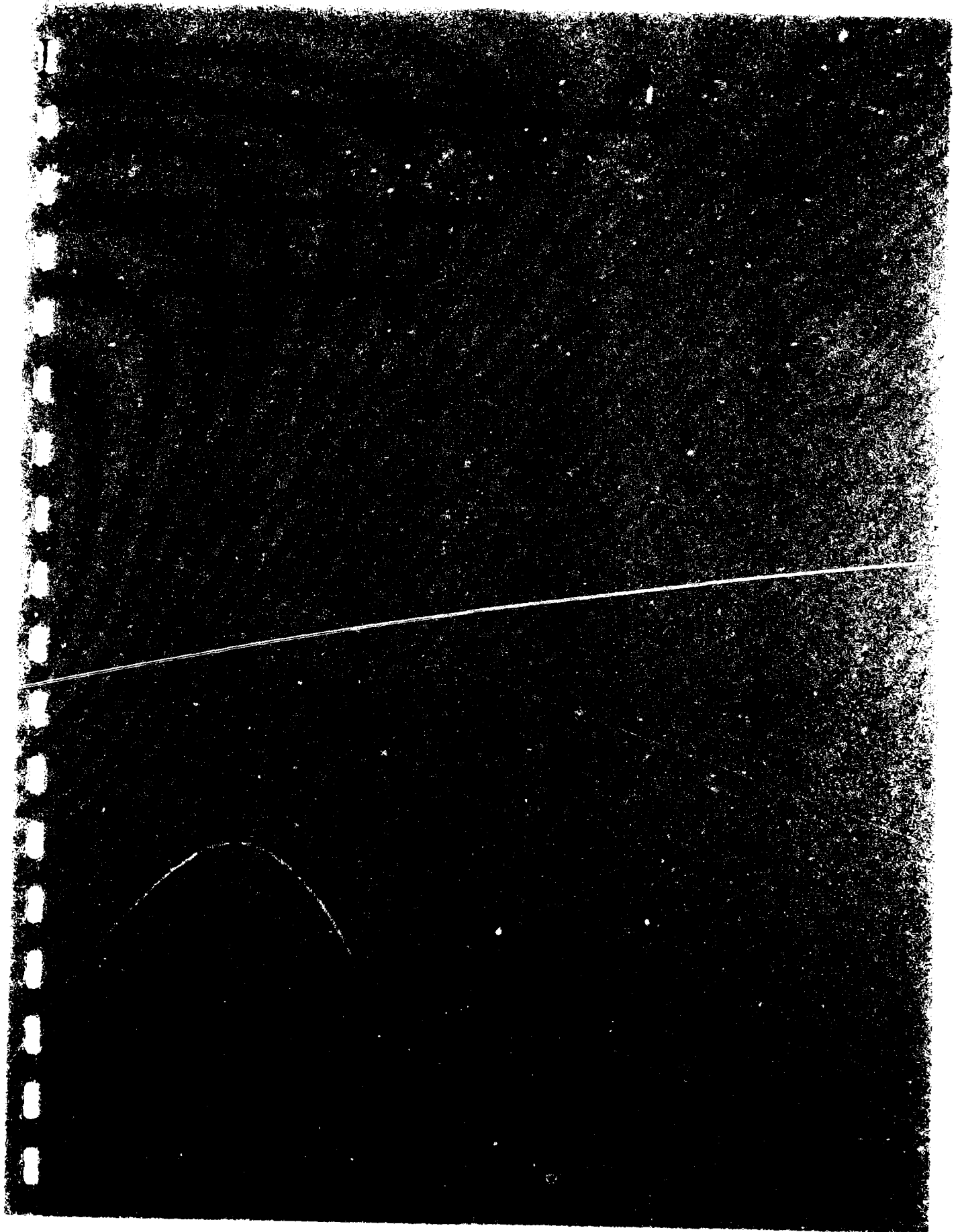
The Owner should implement corrective action as required, based on the results of the above engineering evaluations.

7.3 Remedial Measures

- a. Operation and Maintenance Procedures - The following remedial work should be undertaken by the Owner.
 - (1) Remove brush from riprap and from along spillway walls.
Remove abandoned pole from left end of embankment.

- (2) Restore eroded areas along spillway walls and around the gatehouse.
- (3) Animal burrows in the embankment should be completely filled. An annual inspection should be made to check for evidence of burrowing and corrective action should be taken as required.
- (4) Slightly eroded areas along the top of the riprap, near the left abutment should be monitored and corrective action taken should further deterioration occur.
- (5) The wet area at the embankment toe should be visually monitored on a regular basis, at least until an investigation to assess the need for remedial measures is completed.
- (6) Repair gatehouse door locking mechanism and ensure that door may be opened by authorized personnel.
- (7) Check operating condition of 36-in. sluice gate controlling the reservoir drain and perform any work necessary to ensure the reliability of the drain system in the future.
- (8) Develop a method of quickly removing or releasing the horizontal bar racks at the downstream end of the discharge channel during flood discharges.
- (9) Establish a formal operational procedure and maintenance program and institute a program of biennial technical inspections. The maintenance program should include provisions for the routine maintenance of the outlet works.
- (10) Develop a formal emergency procedures plan and warning system in cooperation with local officials.

7.4 Alternatives - There are no practical alternatives recommended.



VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

DAM: Muddy Cove Pond

DATE: September 10, 1979

TIME: 0830

WEATHER: Clear 74⁰ F

WATER SURFACE ELEVATION UPSTREAM: Spillway Crest

STREAM FLOW: None

INSPECTION PARTY:

1. Roger Wood - Structural and Operation
2. Joseph Downing - Hydraulics & Hydrology
3. Joseph Araujo - Hydraulics & Hydrology
4. John Critchfield - H&A
5. Douglas Gifford - H&A

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Spillway</u>	<u>R. Wood</u>	
2. <u>Outlet Works</u>	<u>R. Wood</u>	<u>Not accessible</u>
3. <u>Dam</u>	<u>R. Wood</u>	
4. <u></u>		

PRESENT DURING INSPECTION:

1. Mr. Hans Paulsen
2.
3.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Muddy Cove Pond

DATE: 10 September 1979

EMBANKMENT: Dam

BY: JWC & DGG

CHECK LIST	CONDITION
1. Upstream Slope	1.
a. Vegetation	a. Grass - neatly mowed.
b. Sloughing or Erosion	b. Slight erosion above rip rap near left abutment.
c. Rock Slope Protection - Riprap Failures	c. Cobbles to 3 ft., good condition.
d. Animal Burrows	d. None observed.
2. Crest	2.
a. Vegetation	a. Grass - neatly mowed.
b. Sloughing or Erosion	b. None observed.
c. Surface cracks	c. None observed.
d. Movement or Settlement	d. None observed.
3. Downstream Slope	3.
a. Vegetation	a. Grass - neatly mowed.
b. Sloughing or Erosion	b. None observed.
c. Surface cracks	c. None observed.
d. Animal Burrows	d. One abandoned burrow; 65 ft. right of spillway halfway up slope.
e. Movement or Cracking near toe	e. None observed.
f. Unusual Embankment or Downstream Seepage	f. Saturated ground with water at surface between Elm St. and toe extending about 150 ft. right of spillway. No soil movement observed. Ruts and standing water in grassed field east of Elm St, below left side.
g. Piping or Boils	g. None observed.
h. Foundation Drainage Features	h. None known.
i. Toe Drains	i. None known.
4. General	4.
a. Lateral Movement	a. None observed.
b. Vertical Alignment	b. Good, embankment crest about 1.25 ⁺ ft. above top of spillway wall.
c. Horizontal Alignment	c. Good.
d. Condition at Abutments and at Structures	d. Slight erosion adjacent to left right spillway walls on upstream slopes.
e. Indications of Movement of Structural Items	e. None observed.
f. Trespassing	f. None.
g. Instrumentation Systems	g. None known.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Muddy Cove Pond DATE: September 10, 1979
SPILLWAY: _____ BY: R. Wood

CHECK LIST	CONDITION
1. Approach Channel	1.
a. General Condition	a. Visible portion good, approach is underwater.
b. Obstructions	b. None observed.
c. Log Boom etc.	c. None.
2. Weir	2.
a. Flashboards	a. None.
b. Weir Elev. Control (Gate)	b. None.
c. Vegetation	c. None observed.
d. Seepage or Efflorescence	d. None observed.
e. Rust or Stains	e. None observed.
f. Cracks	f. None observed.
g. Condition of Joints	g. Good- eroded jt downstream end of weir slab (base jt).
h. Spalls, Voids Or Erosion	h. Surface erosion of weir and cascade.
i. Visible Reinforcement	i. None.
j. General Struct. Condition	j. Very good.
3. Discharge Channel	3.
a. Apron	a. Good condition.
b. Stilling Basin	b. None observed.
c. Channel Floor	c. Very minor stones.
d. Vegetation	d. Grass in expansion jt.
e. Seepage	e. None observed - standing pool at base of cascade.
f. Obstructions	f. Very minor debris - small stones and barbed wire.
g. General Struct. Condition	g. Good.
4. Walls	4.
a. Wall Location _____	a. Left Wall.
(1) Vegetation	1. None observed.
(2) Seepage or Efflorescence	2. Slight eff. at shrinkage cracks.
(3) Rust or Stains	3. None observed except from D/S end.
(4) Cracks	4. Shrinkage cracks only.
(5) Condition of Joints	5. Sealant missing, jt. filler protruding.
(6) Spalls, Voids or Erosion	6. Surface spalling U/S end.
(7) Visible Reinforcement	Surface spalling top D/S end of cascade. Surface spalling side and opening D/S end.
(8) General Struct. Condition	7. None observed.
	8. Good.
	b. Right Wall.
	1. None observed.
	2. Slight eff. at shrinkage cracks and surface spalls.
	3. None except from opening D/S end.
	4. Shrinkage cracks.
	5. Sealant missing, joint filler protruding.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Muddy Cove Pond

DATE: 10 September 1979

SPILLWAY: (Continued)

BY: R. Wood

CHECK LIST	CONDITION
<p>1. Approach Channel</p> <p>a. General Condition</p> <p>b. Obstructions</p> <p>c. Log Boom etc.</p> <p>2. Weir</p> <p>a. Flashboards</p> <p>b. Weir Elev. Control (Gate)</p> <p>c. Vegetation</p> <p>d. Seepage or Efflorescence</p> <p>e. Rust or Stains</p> <p>f. Cracks</p> <p>g. Condition of Joints</p> <p>h. Spalls, Voids Or Erosion</p> <p>i. Visible Reinforcement</p> <p>j. General Struct. Condition</p> <p>3. Discharge Channel</p> <p>a. Apron</p> <p>b. Stilling Basin</p> <p>c. Channel Floor</p> <p>d. Vegetation</p> <p>e. Seepage</p> <p>f. Obstructions</p> <p>g. General Struct. Condition</p> <p>4. Walls</p> <p>a. Wall Location _____</p> <p>(1) Vegetation</p> <p>(2) Seepage or Efflorescence</p> <p>(3) Rust or Stains</p> <p>(4) Cracks</p> <p>(5) Condition of Joints</p> <p>(6) Spalls, Voids or Erosion</p> <p>(7) Visible Reinforcement</p> <p>(8) General Struct. Condition</p>	<p>b.</p> <p>6. Surface Spalls</p> <p>U/S end at approach top.</p> <p>Center above weir.</p> <p>Top mid point of cascade wall.</p> <p>Side just U/S of bridge.</p> <p>7. None observed.</p> <p>8. Good.</p>

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

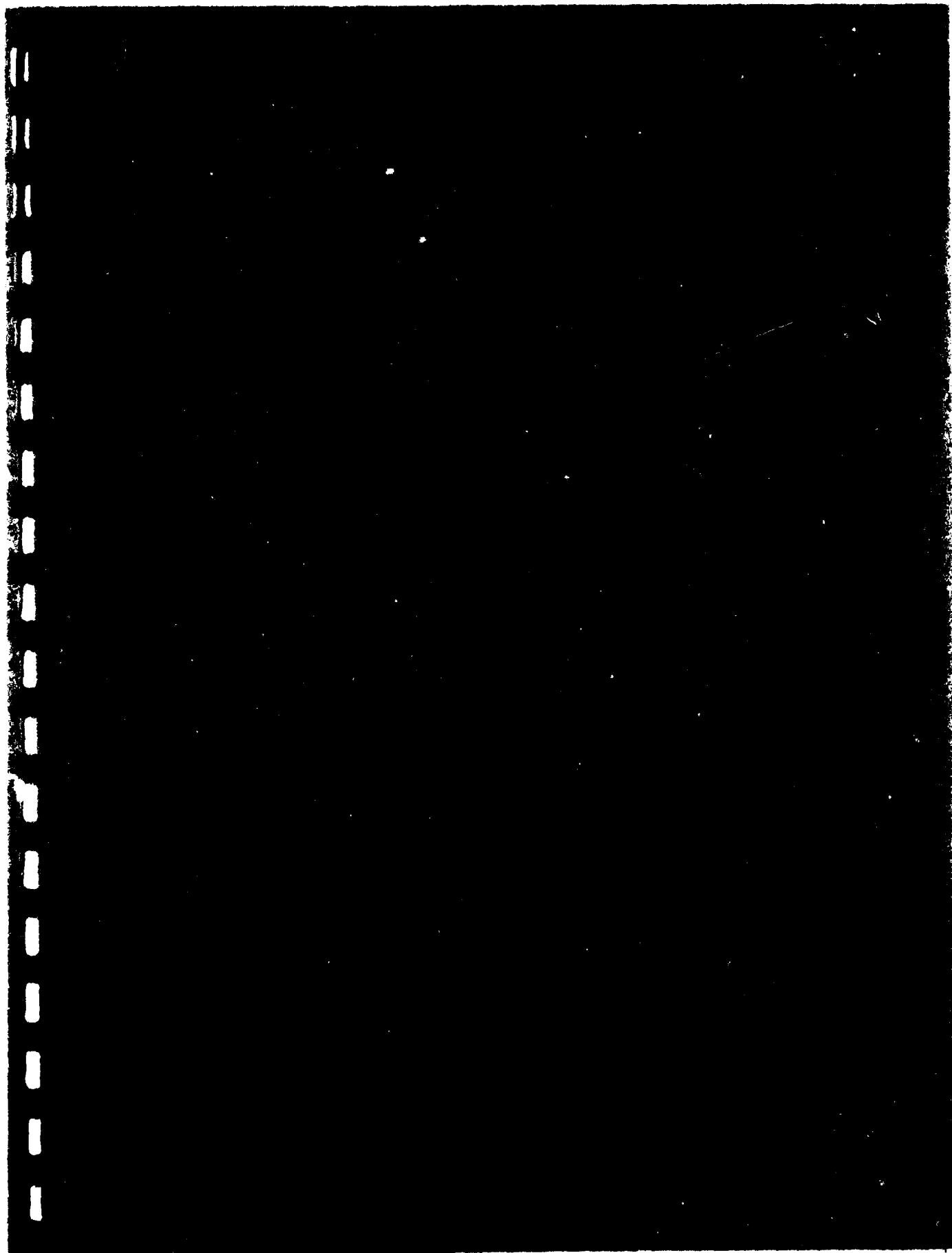
DAM: Muddy Cove Pond Dam

DATE 10 Sept. 1979

OUTLET WORKS:

BY: R. Wood

CHECK LIST	CONDITION
1. Inlet a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates 2. Control Facility a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks 3. Outlet a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks 4. Mechanical and Electrical a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection 5. Other	Owner unable to unlock outlet works building door. Outlet works not accessible for inspection.



LIST OF AVAILABLE DOCUMENTS
MUDDY COVE POND

<u>DOCUMENT</u>	<u>LOCATION</u>
1. Original Muddy Cove Pond Dam Design Drawings by Jenks & Ballou, Consulting Engineers, February 1948. Sheets 1, 1A, 2 thru 16. Also Sheet No. 1 (contour map and flow line) and June 1944 Location Map, Plan and Sections.	Engineering Office of ICI Americas Inc., 333 Main Street, Dighton, MA 02715
2. Construction Contract and Specifications dated February 20, 1950	Engineering Office of ICI Americas Inc., 333 Main Street, Dighton, MA 02715
3. Two Volumes of Construction Photographs	Engineering Office of ICI Americas Inc., 333 Main Street, Dighton, MA 02715
4. Letter Report by Jenks & Ballou, Consulting Engineers discussing storage potential of proposed dam dated April 6, 1948.	Engineering Office of ICI Americas Inc., 333 Main Street, Dighton, MA 02715

DESCRIPTION OF DAM

DISTRICT 6

Submitted by A.H. Lonsbury

Dam No. 63-76-1

DATE: Feb 14, 1972

City/Town DISHMAN

Name of Dam Hopman

Location Topo Sheet No. 33 C

Provide 8 1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

Year built: 1945

Year/s of subsequent repairs UNK

Purpose of Dam: Water Supply

Recreational

Irrigation

Other Industrial Use

Drainage Area:

0.4

sq. mi.

2.68

acres.

TOTAL: 2.9

TOTAL 1848 ACRES

Normal Pooling Area:

22

Acres

Ave Depth

10

Impoundment: 72 million

gals.

220

acre ft.

No. and type of dwellings located adjacent to pond or reservoir

NONE

i.e. summer homes etc.

Dimensions of Dam:

Length 1030

Max. Height

27

Slopes: Upstream Face

2:1

Downstream Face

2:1

Width across top

15'

Classification of Dam by Material:

Earth ☒

Conc. Masonry

Stone Masonry

Timber 3

Rockfill

Other

A. Description of present land usage downstream of dam:

100% Forest

Urban

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure YES NO

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Case No. 63-2-1

Risk to life and property in event of complete failure.

No. of people _____.

No. of Homes _____.

No. of Businesses _____.

No. of Industries Amphib.

Type _____.

No. of utilities _____.

Type _____.

Railroads _____.

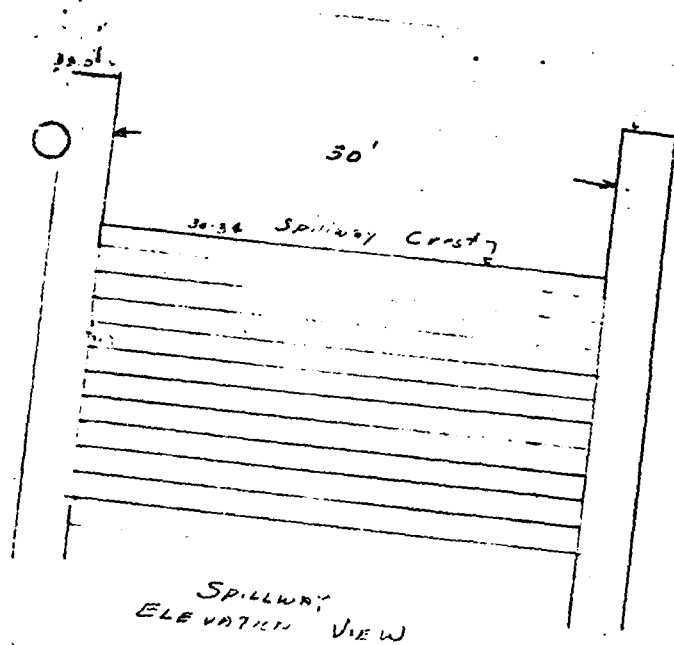
Other dams _____.

Other ford - elm st.

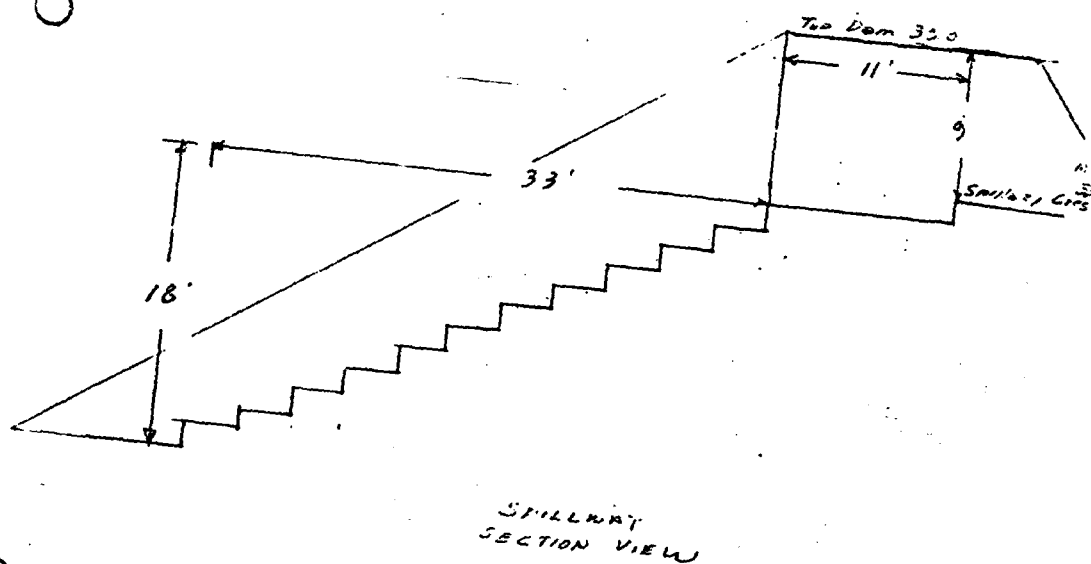
2.

Attach Sketch of dam to this form showing section and plan on 8 1/2" x 11" sheet.

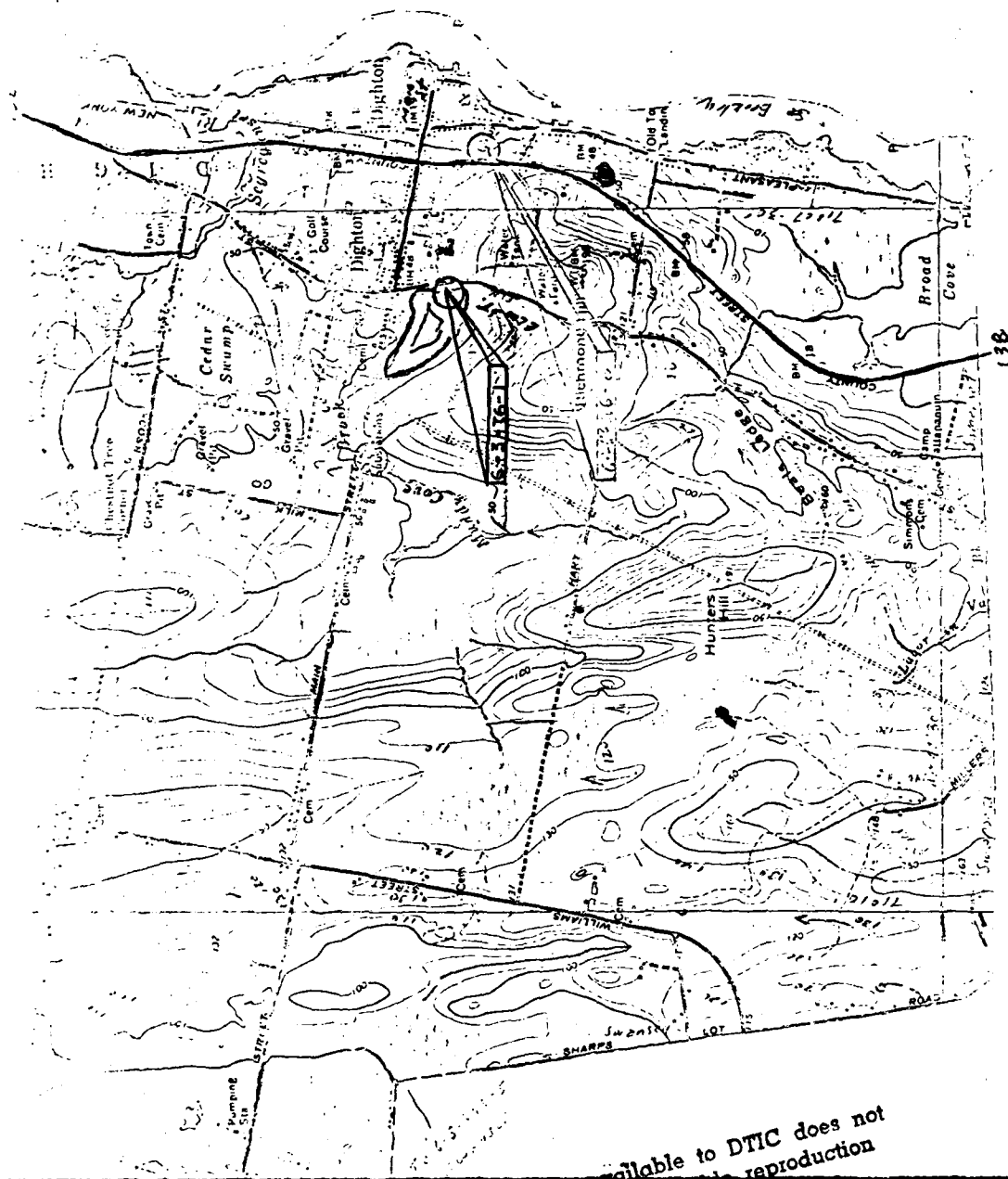
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65-76-1
Sheet 2 of 2
NA 1214
18955

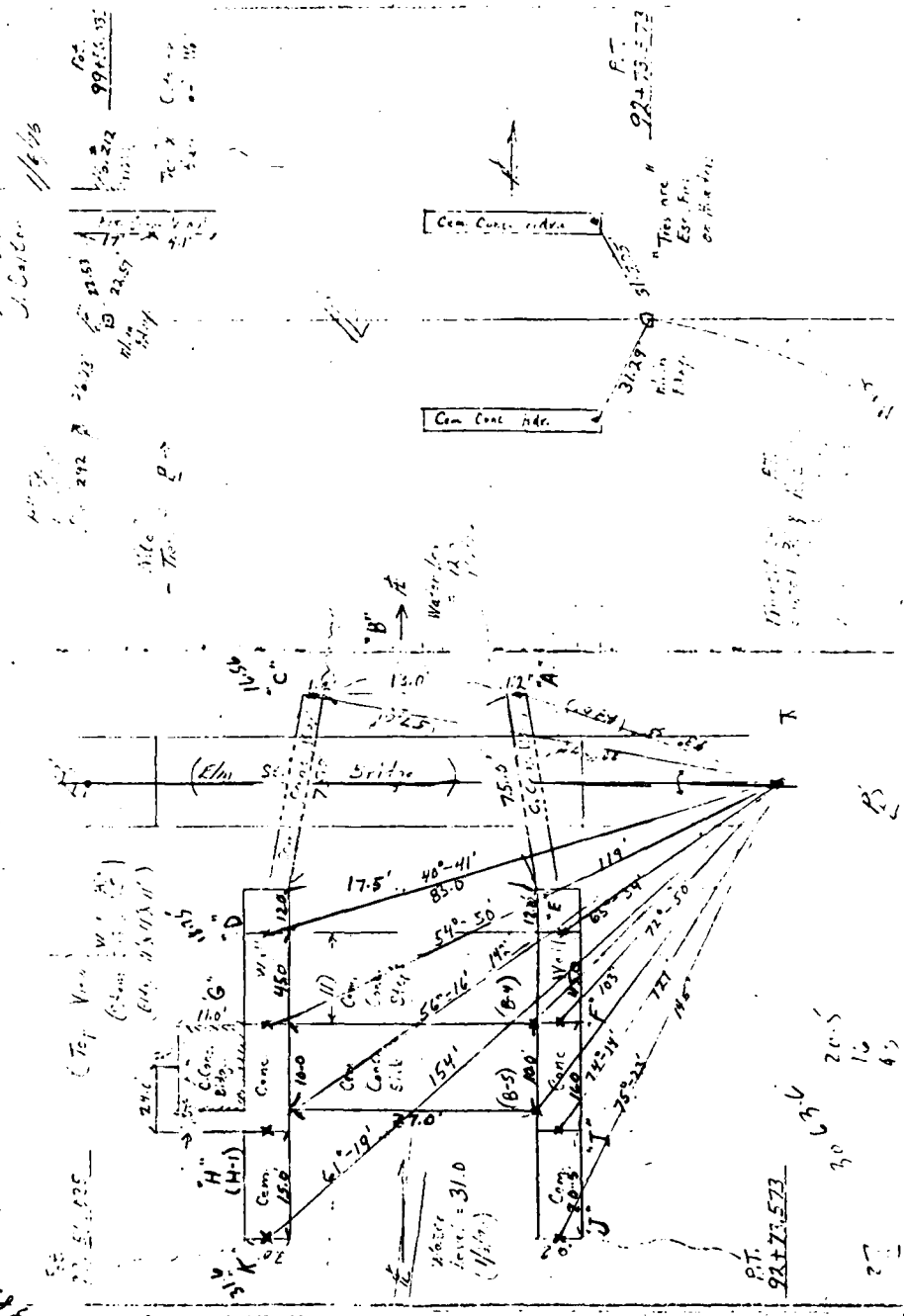


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1890-1891



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60

01962

61

Handwritten notes: 1349-14 153-149, 1.71

<u>A</u>		<u>C</u>	
T.W.	6.97	T.W.	6.49
	16.58		16.56
<u>E</u>		<u>C</u>	
T.W.	4.20	T.W.	4.20
	18.85		18.75
<u>B</u>		<u>C</u>	
T.W.	7.23	T.W.	7.23
	10.12		10.12
<u>F</u>		<u>C</u>	
T.W.	58.4	T.W.	58.4
	38.4		38.4
<u>G</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>H</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>I</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>J</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>K</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>L</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>M</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>N</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>O</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>P</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>Q</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>R</u>		<u>C</u>	
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	31.1		31.1
<u>S</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>T</u>		<u>C</u>	
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	31.1		31.1
<u>U</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>V</u>		<u>C</u>	
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	31.1		31.1
<u>W</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>X</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>Y</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1
<u>Z</u>		<u>C</u>	
T.W.	31.1	T.W.	31.1
	31.1		31.1

Display - 1

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BRISTOL COUNTY, MASS. DATA SHEET & INSPECTION FORM FOR DAMS

Town Norton Date of Inspection 1/12/59
 Dam No. 1 Inspected By RMB
 Stream Richmond Brook Organization Hayden, Harding & Buchanan, Inc.
Daddy Cove Brook
 Location: USGS Quad Somerset Lat 41° 48' -45" Long 71° 07' -45"
 Reference: West of Elm Street and South of Main Street

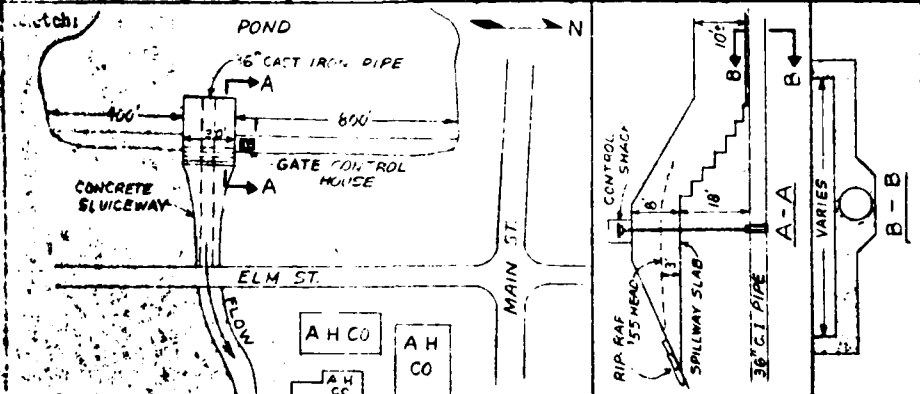
Owner of Dam A. Hoffman & Co. Function of Dam Processing & Boiler Water

Drainage Area _____ Character of D.A. _____

Flood of Record (date) _____ Discharge (or high water el.) _____

General Description of Dam and Discharge Control: Built in 1948. Approximately 1800' earth embankment (clay core) with 30' concrete spillway and 36" cast iron pipe thru spillway section with valve control - discharges under sluiceway slab. 6' freeboard. Approx. 3' head thru spillway during '55 with gate valve closed.

Estimated Discharge Capacity: Spill - 6' head, 2' freeboard $Q = 3.9 \times 30 \times 6^{3/2} = 1740$ cfs
gate (15' head) 150 cfs approx. 2000 cfs



Remarks and Recommendations: Discharge provisions appear adequate check D.A.

General Condition

Good ☒

Fair

Poor

Priority 5

File Ref. 13

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APPENDIX B-8

BRISTOL COUNTY, MASS. INSPECTION REPORT FOR DAMS PREPARED FOR THE BRISTOL COUNTY COMMISSIONERS BY UNIVERSAL ENGINEERING CORP, BOSTON, MASS.	
<div style="float: right;"> DAM NO <u>Di-1</u> TOWN <u>Dighton</u> </div>	
INSPECTION DATE	REMARKS & RECOMMENDATIONS
7-27-70	<p>There is presently a very low flow over the spillway (1 inch or less). The 36 inch pipe is partially open and there is a moderate flow. There appears to be a spring leak in the south abutment under Elm Street causing a flow along the abutment and spillway onto the apron just upstream from the 36 inch outlet. This leak should be investigated as a potential hazard during high floods. The trash rack located easterly of Elm Street is in need of repair, however it may be advisable to replace this with a trash rack at the upstream face of the spillway.</p>
<div style="float: left;"> Supplement to original report and data by Hayden, Harding & Buchanan, Inc. </div> <div style="float: right;"> DAM NO <u>Di-1</u> </div>	

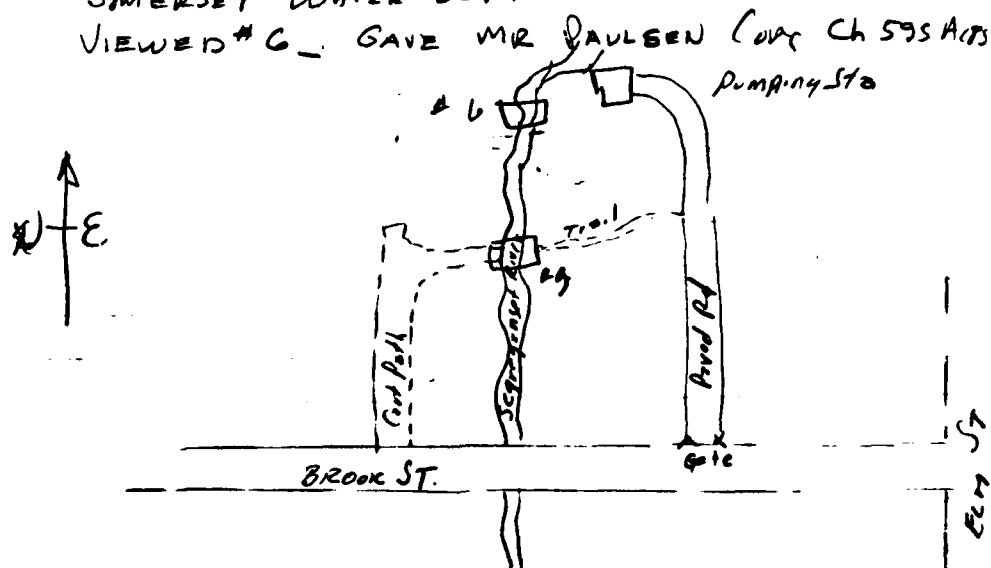
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APPENDIX B-10

DIGHTON 6-3-76- 1, 6, 8, 9

May 21, 1975

1:30 PM MET WITH MR. HANS PAULSEN, SITE ENGINEER'S
MANAGER FOR ICI UNITED STATES INC. OF DIGHTON
VIEWED SMALL SPILLWAY EAST OF #1
VIEWED #1 EXCELLENT NOTED WET SPOT SOUTH OF
STREAM Y2 WHY BETWEEN DIKE & ELMST MAY BE
LOW SPOT WATER BUT SUGGESTED WATCHING.
VIEWED #8 WHICH IS ACTUALLY A TIDE GATE TO
HOLD BACK HIGH INCOMING TIDES SURIS DOUBTFUL BUT
SINCE IT CAN CAUSE AN IMPOUNDMENT - RETAIN POND:
VIEWED #9 - SMALL DAM NORTH OF BROOK ST REACHED
BY CART PATH WEST OF BROOK THIS IS OWNED BY
TOWN OF SOMERSET BUT ICI HAS WATER RIGHTS
AND OPERATES DAM. THEY PLAN TO PLACE A CONCRETE
WALL EAST SIDE OF BROOK WHERE EROSION HAS
OCCURRED - ALSO PLAN TO ENCLOSE DAM AREA WITH
FENCE^{PR} TO VANDALISM - HAVE LETTER OF OK FROM
SOMERSET WATER DEPT.
VIEWED #6 - GAVE MR. PAULSEN COPY CH 595 APR 197



INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town Dighton Dam No. 6-3-76-1
 Name of Dam HOFEMAN Inspected by: Lounsbury/1
 Date of Inspection 2/10/76

2. Owner/s Per; Assessors ☒ Prev Inspection _____
 Reg. of Deeds _____ Pers. Contact _____

1. ICI ORGANICS INC MAIN ST. DIGHTON MASS
 Name St. & No. City/Town State Tel No.

2. _____
 Name St. & No. City/Town State Tel No.

3. _____
 Name St. & No. City/Town State Tel No.

3. Caretaker (If any) e.g. superintendant, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. & No. City/Town State Tel No.

4. No. of Pictures taken _____

5. Degree of Hazard: (If dam should fail completely)*

1. Minor ☒ 2. Moderate _____

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes (Future development)

6. Outlet Control: Automatic _____ Manual ☒
 Operative ☒ yes ; _____ No.

Comments: _____

7. Upstream Face of Dam: Conditions:

1. Good ☒ 2. Minor Repairs _____
 3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

DAI ID. 6-3-76-1

8. Downstream Face of Dam: Condition: 1. Good ☒ 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

9. Emergency Spillway: Condition: 1. Good ☒ 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level @ time of inspection: _____ ft. above _____ below _____
top of dam _____ principal spillway _____
other Top of Spillway EL. 30.34

11. Summary of Deficiencies Noted:

Growth (trees and brush) on Embankment	<u>NVC</u>
Animal burrows and washouts	_____
Damage to slopes or top of dam	_____
Cracked or Damaged Masonry	_____
Evidence of Seepage	_____
Evidence of Piping	_____
Erosion	_____
Leaks	_____
Trash and/or debris impeding flow	_____
Clogged or blocked spillway	<u>✓</u>
Other	_____

DAM NO. 63-76-1

12. **Remarks & Recommendations:** (Fully explain)

13. Overall Condition:

1. Safe ✓.
2. Minor repairs needed _____.
3. Conditionally safe-major repairs needed _____.
4. Unsafe _____.
5. Reservoir impoundment no longer exists (Explain)
Recommend removal from inspection list. _____.

INSPECTION REPORT - DAMS AND RESERVOIRS

Location: City/Town DIGHTON

Dam No. 4-3-76-1

Name of Dam HOFFMAN

Inspected by: SCREEN

Date of Inspection 1-17-78

Owner/s: Part: Assessors: Prev Inspection:

Reg. of Deeds: Pers. Contact:

1. 161 UNITED STATES INC 939 MAIN ST DIGHTON MASS
Name St. No. City/Town State Tel. No.

2. Name St. No. City/Town State Tel. No.

3. Name St. No. City/Town State Tel. No.

Caretaker: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. No. City/Town State Tel. No.

No. of Pictures taken:

Degree of Hazard: (if dam should fail completely)*

1. Minor 2. Moderate

3. Severe 4. Disastrous

*This rating may change as land use changes (Future development)

Outlet Control: Automatic Manual

Operative yes No.

Comments:

Upstream Face of Dam: Condition:

1. Good 2. Minor Repairs

3. Major Repairs 4. Urgent Repairs

Comments: COVERED BY SNOW

DAM NO. 6-3-76-1

Downstream Face of Dam: Conditions: 1. Good _____, 2. Minor Repairs _____,
3. Major Repairs _____, 4. Urgent Repairs _____.

Comments: EVIDENCE OF SEEPAGE BETWEEN ELM ST AND
FACE OF DAM - BURROW HOLES

9. Emergency Spillways: Conditions: 1. Good _____, 2. Minor Repairs _____,
3. Major Repairs _____, 4. Urgent Repairs _____.

Comments: _____

10. Water level @ time of inspection: 3" above ✓ below _____,
top of dam _____, principal spillway ✓,
other _____.

11. Summary of Deficiencies Noted:

Growth (Trees and Brush) on Embankment ✓
Animal Burrows and Fishouts BURROWS
Damage to slopes or top of dam ✓
Cracked or Damaged Masonry OUTLET SPILLWAY
Evidence of Seepage YES
Evidence of Piping _____
Erosion ✓
Leaks _____
Trash and/or debris impeding flow _____
Clogged or blocked spillway _____
Other evidence of high iron content in water at
evidence of seepage SOUTH OF SPILLWAY BETWEEN
FACE OF DAM AND ELM ST.

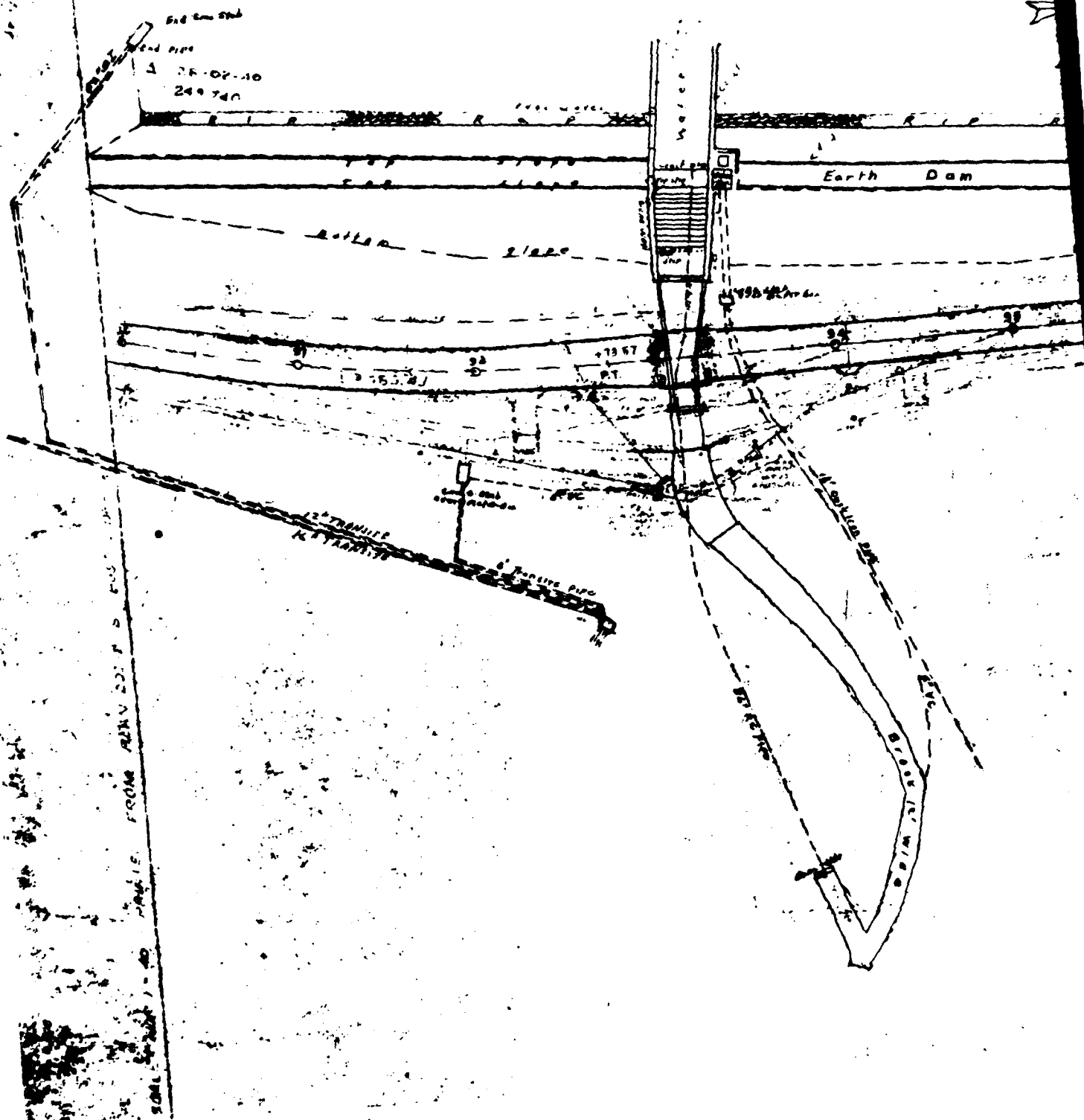
DAM NO. _____

12. Remarks & Recommendations: (Fully Explain)

Overall Condition:

1. Safe _____
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists (explain)
Recommended removal from inspection list _____

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6-3-76-1
HOFFMAN (NIGHTON)

Earth Dam

ECM ST. LANE

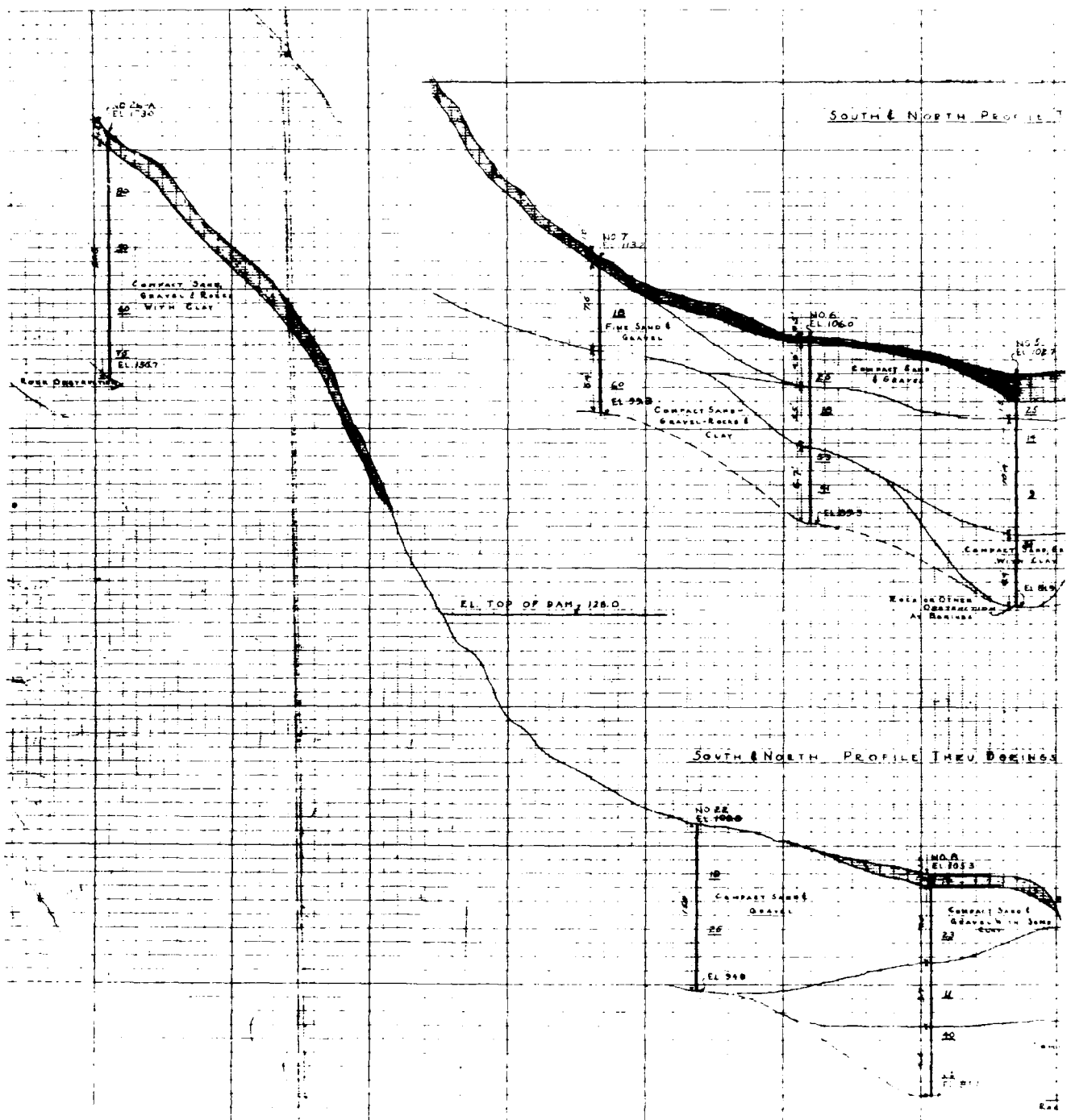
To New York

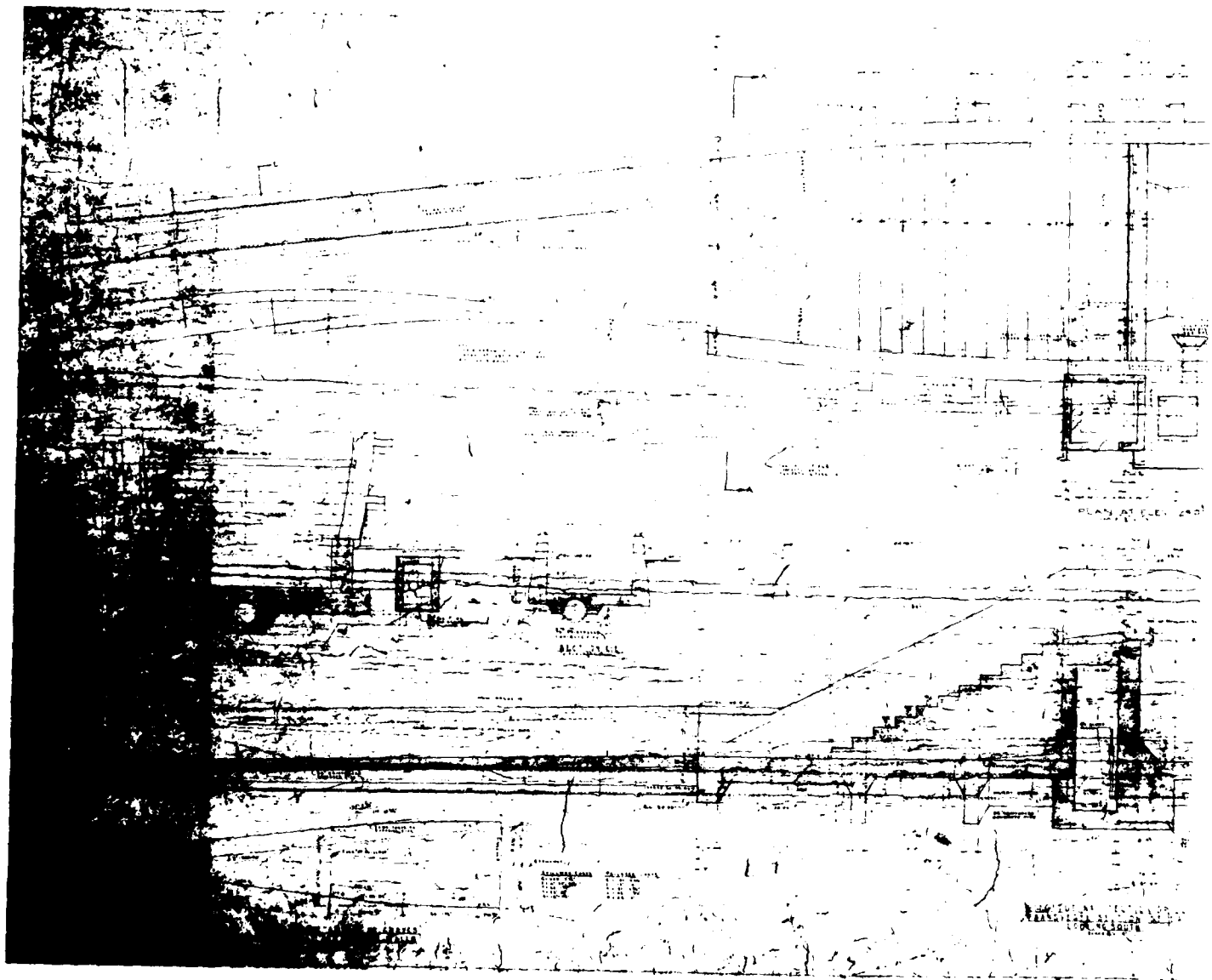


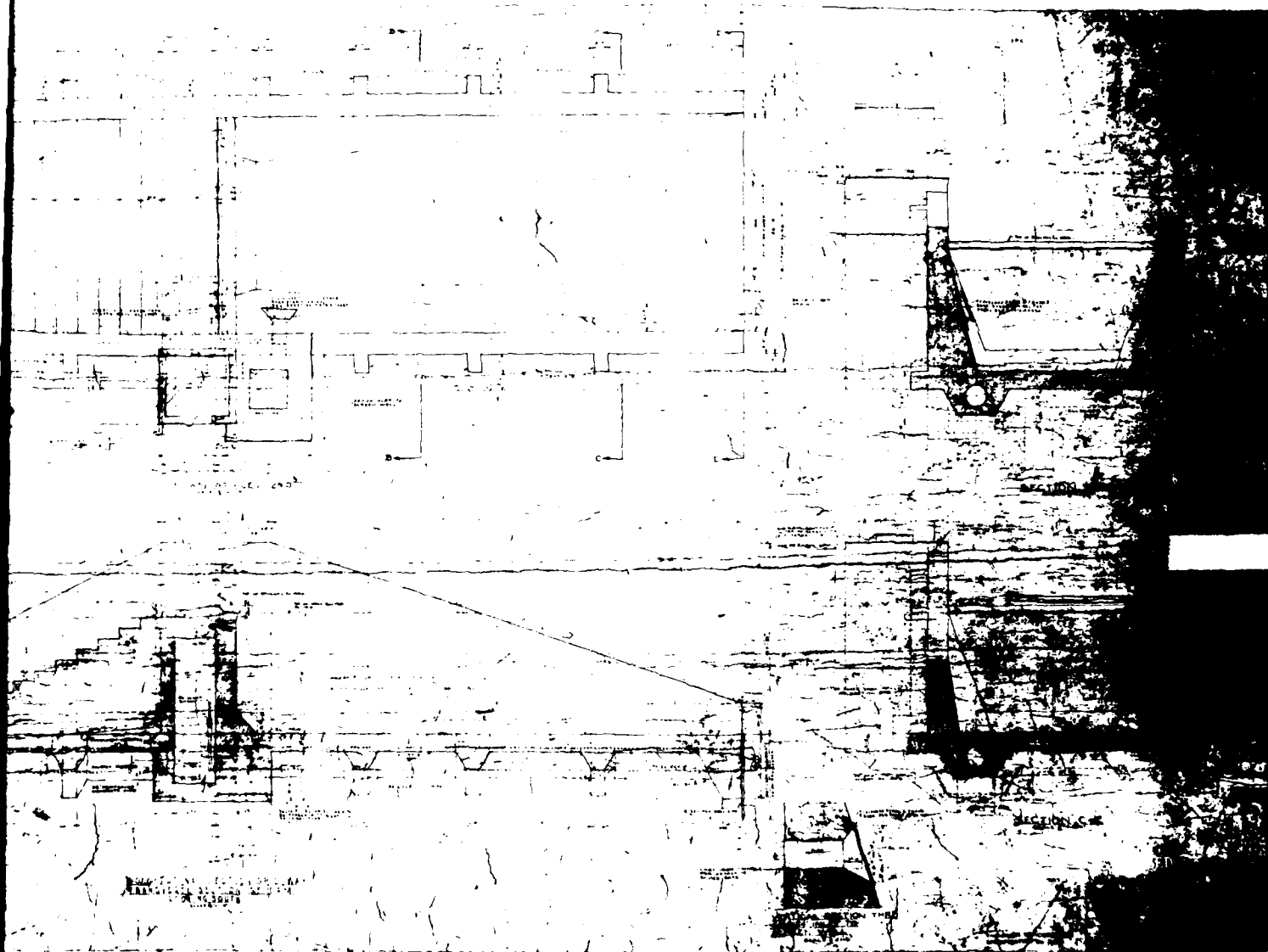
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APPENDIX B-18

2

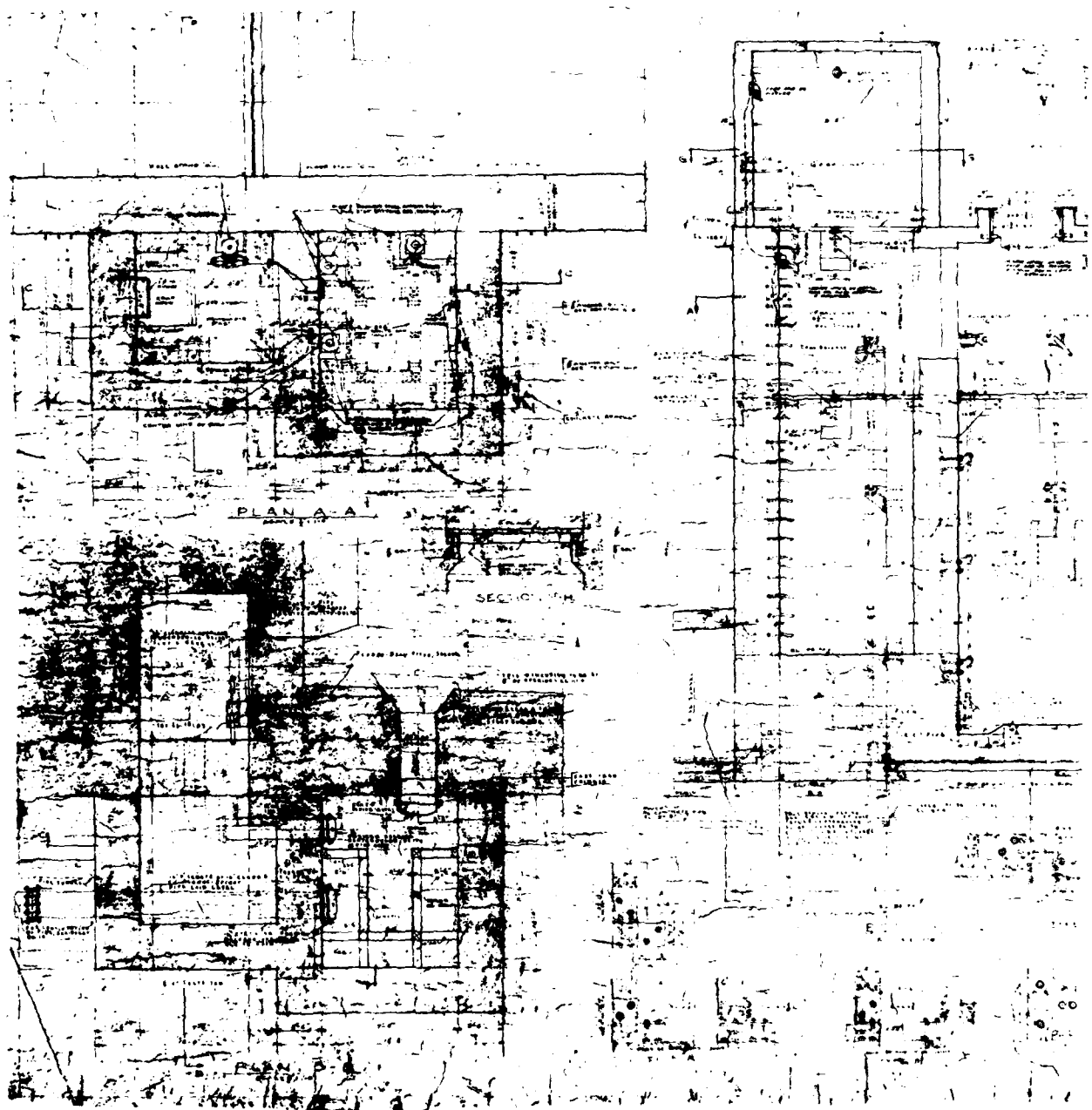


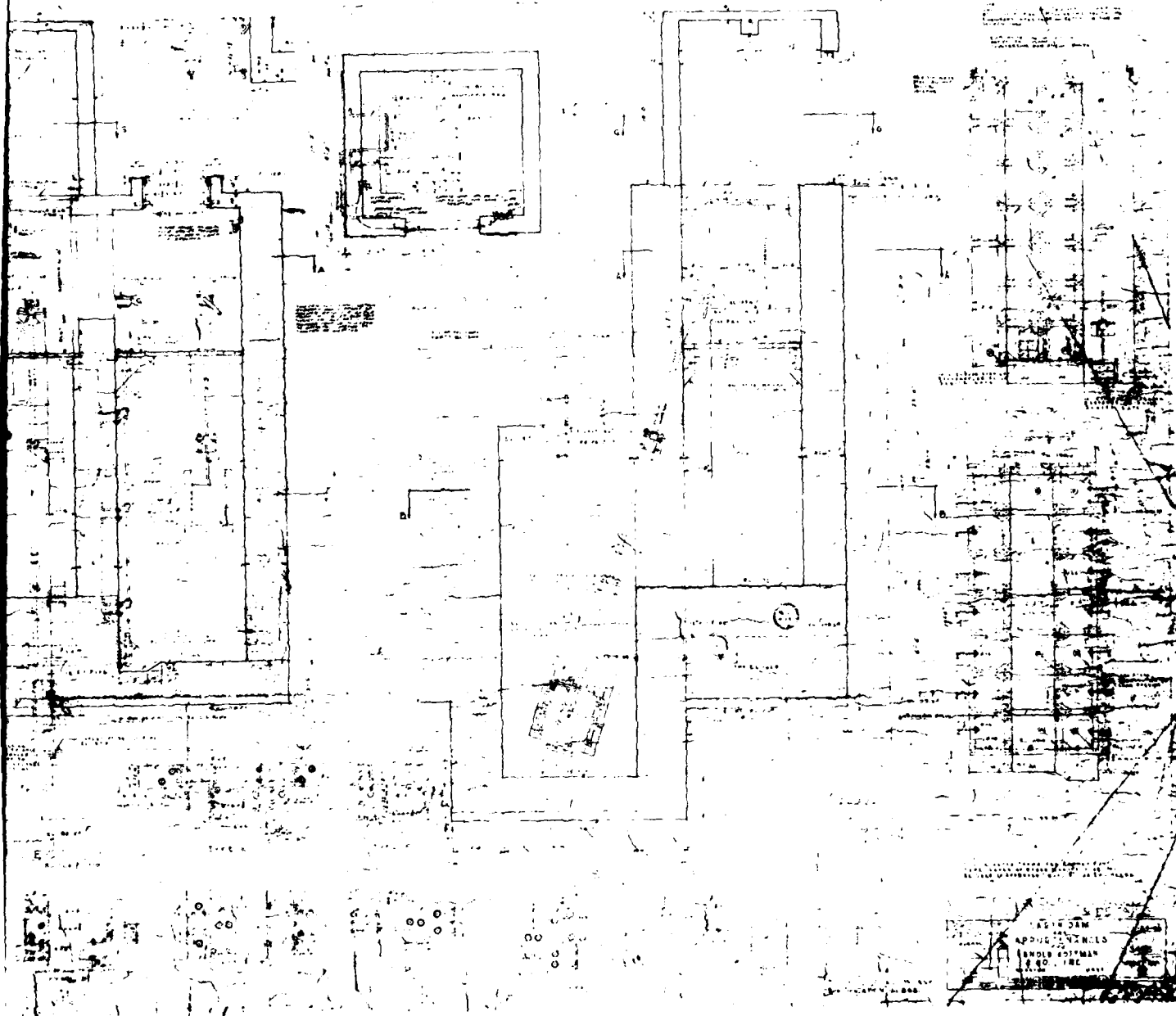




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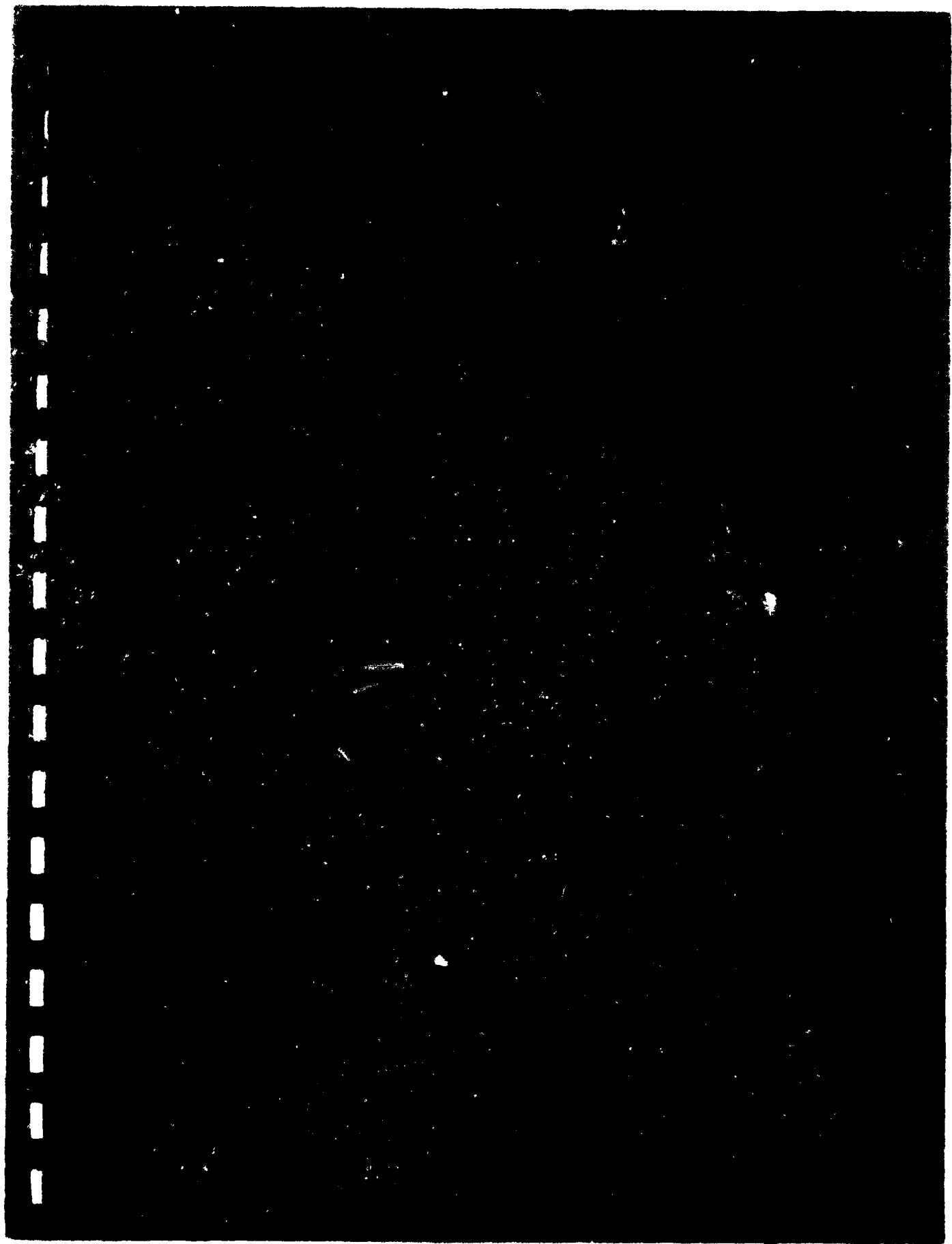
2

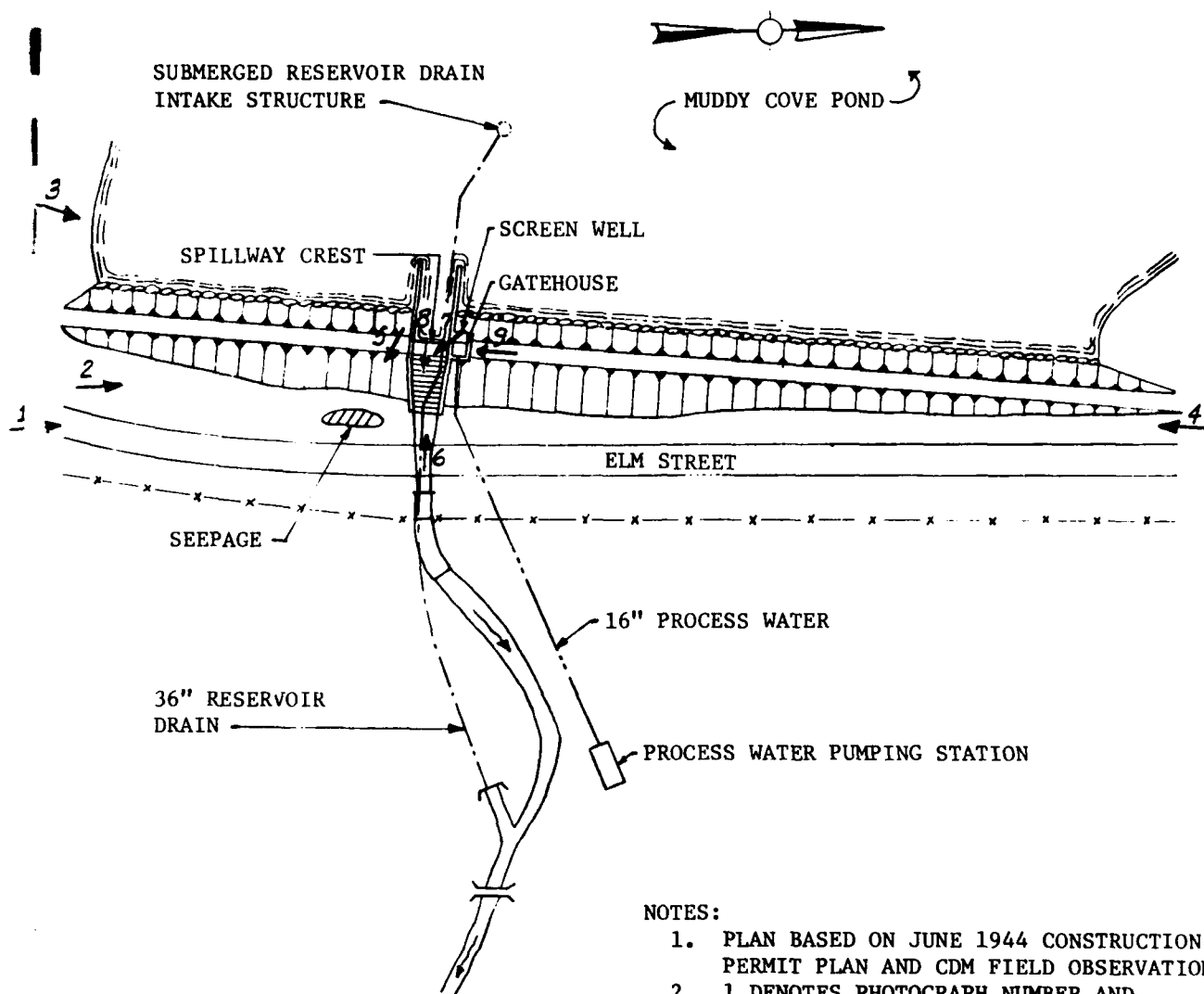




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2.





NOTES:

1. PLAN BASED ON JUNE 1944 CONSTRUCTION PERMIT PLAN AND CDM FIELD OBSERVATIONS.
2. 1 DENOTES PHOTOGRAPH NUMBER AND DIRECTION OF VIEW.

CAMP DRESSER & MCKEE, INC. BOSTON, MASSACHUSETTS		U.S.ARMY ENG. DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
LOCATION OF PHOTOGRAPHS			
MUDDY COVE POND		MASSACHUSETTS	
			Scale; Not To Scale
			Date; OCT. 1979



2. DOWNSTREAM FACE OF DAM FROM RIGHT ABUTMENT.



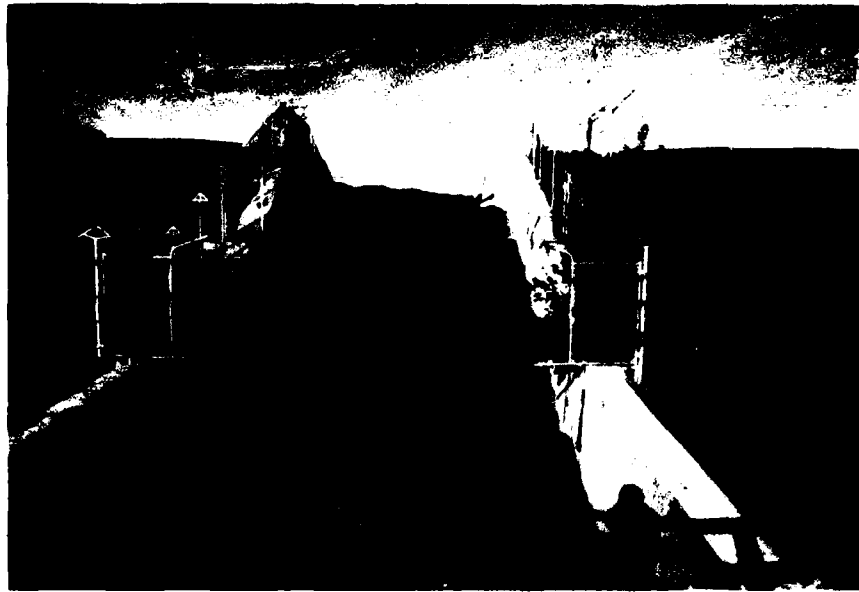
3. UPSTREAM FACE OF DAM FROM RIGHT ABUTMENT.



4. CREST OF DAM FROM LEFT ABUTMENT.



5. SEEPAGE AT TOE OF DAM NEAR SPILLWAY RIGHT ABUTMENT.



6. VIEW OF SPILLWAY FROM ELM STREET BRIDGE.



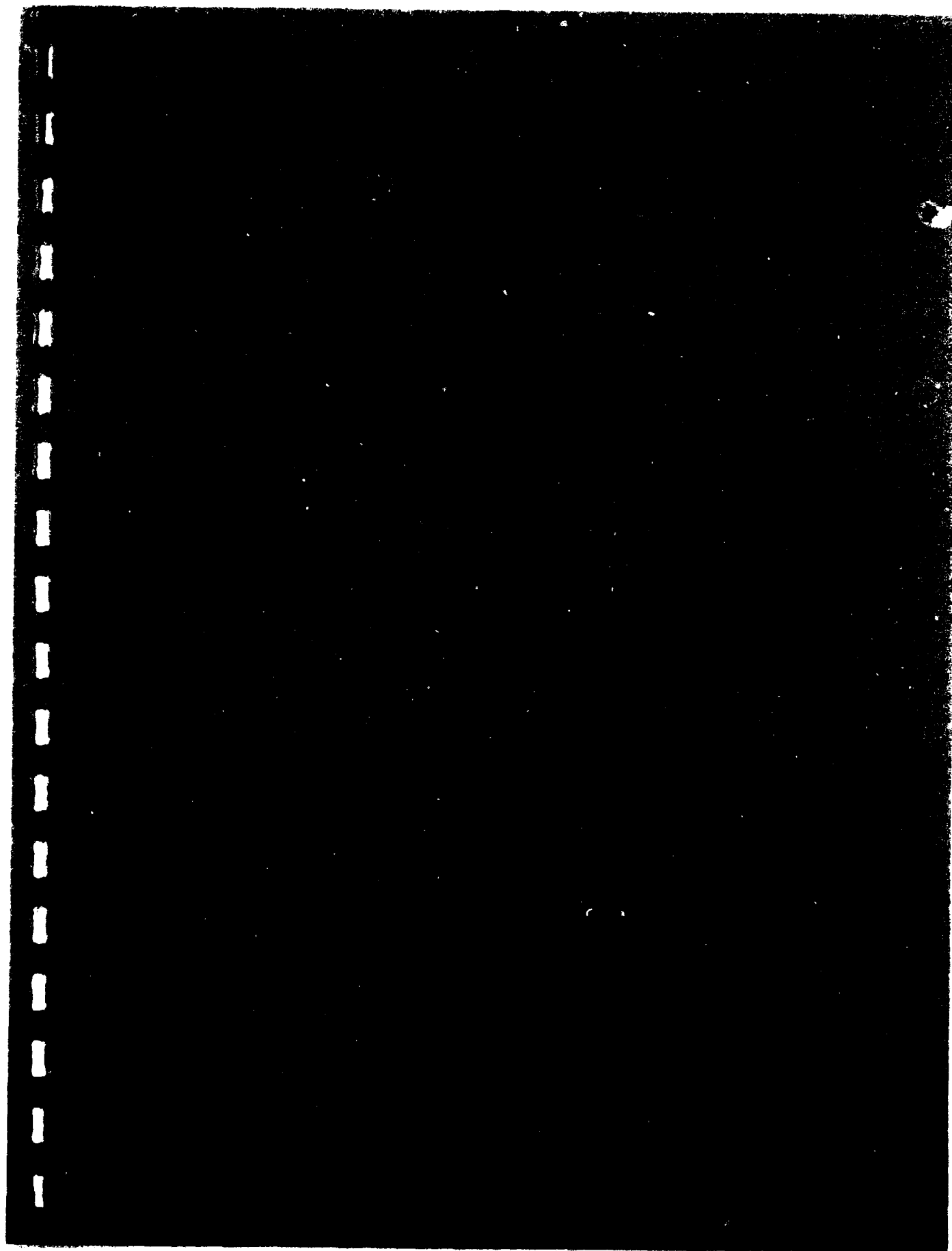
7. SPILLWAY CREST FROM SPILLWAY LEFT ABUTMENT



8. VIEW OF DOWNSTREAM CHANNEL FROM SPILLWAY CREST.



9. VIEW OF OUTLET WORKS GATEHOUSE LOCATED ON SPILLWAY LEFT ABUTMENT.





DAM MUDDY COVE POND DAM

IDENTIFICATION NO. MA 00793



DAM FAILURE IMPACT
AREA MAP

APPROX. SCALE: 1" = 2000'

APPENDIX D-2

CLIENT CORDS OF ENG'RSJOB NO 380-G-RT-13PAGE 1PROJECT DAM INSPDATE CHECKED 10-16-79DATE 10-4-79DETAIL Muddy Cove Burl DamCHECKED BY Joe ACOMPUTED BY JEDELEVATIONS

Based on existing plans and field measurements, the following elevations are established on Local Datum used on plans.

Top of earth embankment :	Elev. 130.5	hydraulic height
Top of spillway abutments :	Elev. 129.0	= 129 - 102 = 27'
Spillway Crest :	Elev. 121.0	
Toe of spillway :	Elev. 102.0	

A field survey by the Mass. DAW on 1/6/76 established the spillway crest at Elev. 30.4 NGVD. \therefore diff. = 121 - 30.4 = 90.6 ft.

SURFACE AREAS

from USGS Quad: Somerset, Mass. - 1967

Drainage Area = 1767 acres = 2.76 mi²

Pond W.S. Area = 24 acres (Elev. 30.4 NGVD or 121.0 Local Datum)

Contour Elev. 40 = 43 acres (or Elev. 130.6 Local Datum)

STORAGE CAPACITIES

Spillway Crest (Elev. 121.0) = 53,359,000 gals. = 164 ac.-ft.
 Elev. 130.6 = 164 + $\left(\frac{24+43}{2}\right) \times 9.6 = 164 + 322 = 486$ ac.-ft.
 * from owners records

SIZE CLASSIFICATION

Hydraulic Height = 27'

Storage at top of dam = $\left[\frac{(486-164)}{(9.6)}\right] \times (129-121) + 164 = 432$ ac.-ft.

\therefore size is SMALL

HAZARD CLASSIFICATION

A dam failure would inundate ICI Americas Inc. mill¹ complex by about 10 ft.

\therefore hazard classification is HIGH

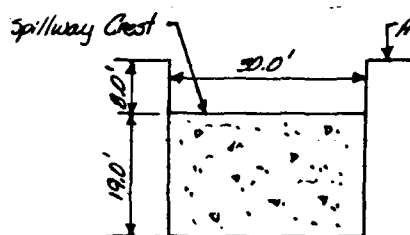
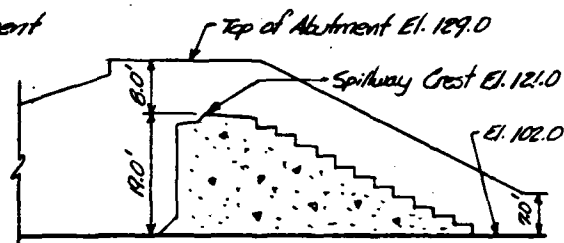
CLIENT CORPS OF ENGINEERS
 PROJECT DAM INSP.
 DETAIL Muddy Cove

JOB NO. 280-6-RT-13DATE CHECKED 10-18-79CHECKED BY Lee A.PAGE 2DATE 10-4-79COMPUTED BY JEDTEST FLOOD DETERMINATION

Small size & High Hazard: COE Guidelines give range of $\frac{1}{2}$ PMF to PMF, use $\frac{1}{2}$ PMF

The drainage area is typically flat & coastal with substantial marsh areas. \therefore CSM for a PMF is 900 cfs per sq. mi. or 900 ft = 450 CSM for $\frac{1}{2}$ PMF.

Test Flood Inflow = $450 \text{ csm} \times 2.76 \text{ mi}^2 = 1242 \text{ cfs}$
 say 1250 cfs

STAGE-DISCHARGE RELATIONSHIPSSPILLWAY ELEVATIONSPILLWAY CROSS SECTION

$$Q = CLH^{3/2}, L=30 \text{ ft}, "C" \text{ varies with } H$$

W.S. ELEV.	HEAD (ft.)	"C" VALUE	Q (cfs)
121.0	0	-	0
122.0	1	2.87	846
123.0	2	2.88	244
124.0	3	2.90	452
125.0	4	2.92	701
126.0	5	2.96	993
127.0	6	3.01	1,327
128.0	7	3.06	1,700
129.0	8	3.12	2,118

Client: COE

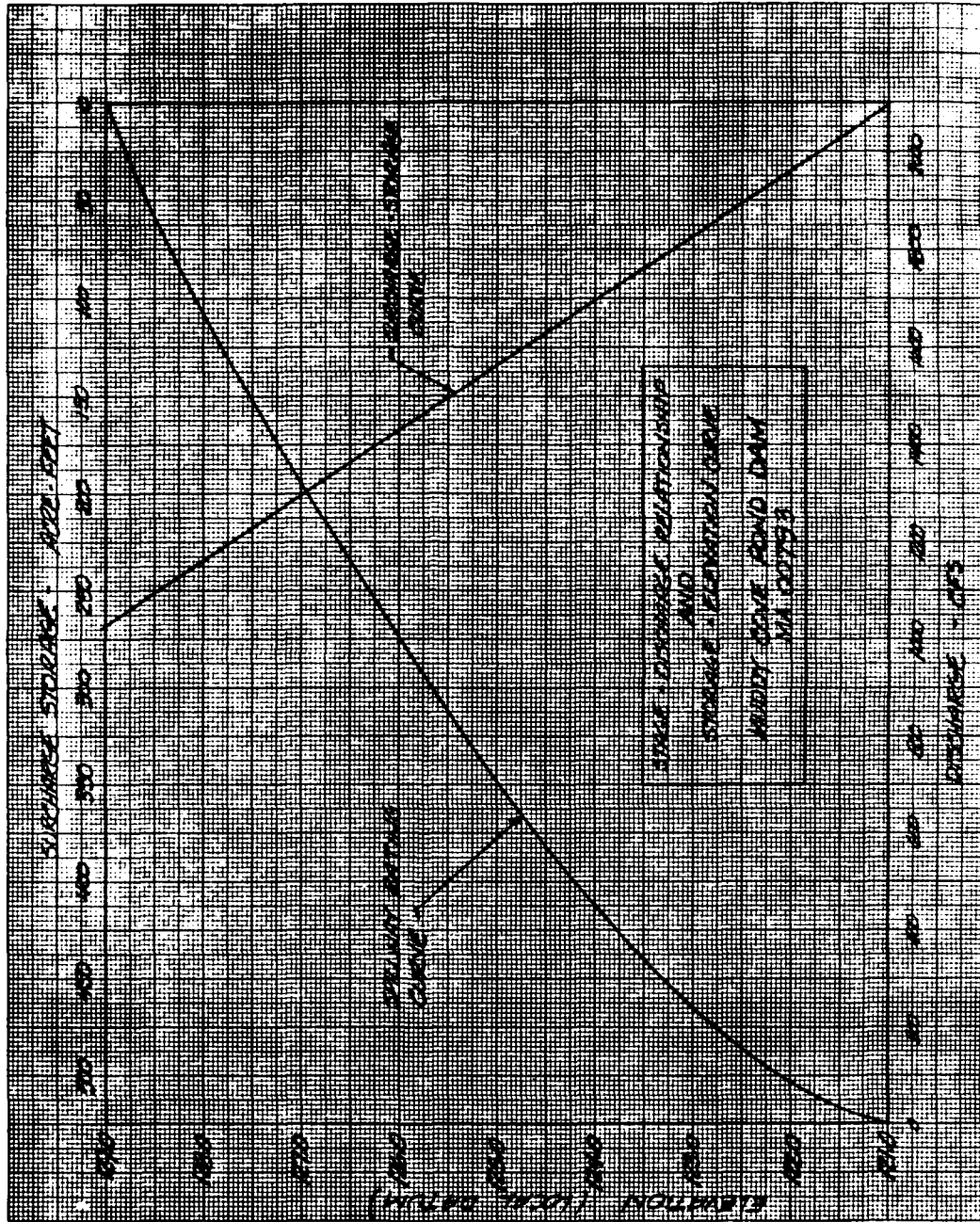
Job #: 380-6-RT-13

DATE: 10-4-79

3

IN STOCK DIRECT FROM CODES BOOK CO., NORWOOD, MASS. 02062

NO. 518A, MILLIMETERS, 200 BY 150 L.VISIONS



CLIENT CORPS OF ENGINEERSJOB NO. 280-4-87-13PAGE 4PROJECT DAM INSPDATE CHECKED 11-16-79DATE 10-4-79DETAIL Muddy CrkCHECKED BY Joe A.COMPUTED BY JEDSURCHARGE-STORAGE ROUTING

$$\text{Test Flood Inflow} = 1250 \text{ cfs} = Q_{p1}$$

$$\text{Surcharge Height to pass } Q_{p1} = 126.8$$

$$\text{STOR}_1 = \frac{144 \text{ ac-ft} \times 12' / \text{ft}}{1767 \text{ ac}} = 1.317 \text{ inches}$$

$$Q_{p2} = Q_{p1} \left(1 - \frac{\text{STOR}_1}{9.5'} \right) = 1250 \left(1 - \frac{1.317}{9.5} \right) = 1077 \text{ cfs}$$

$$\text{Surcharge Height to pass } Q_{p2} = 126.25$$

$$\text{STOR}_2 = \frac{175 \text{ ac-ft} \times 12' / \text{ft}}{1767 \text{ ac}} = 1.188 \text{ inches}$$

$$\text{STOR}_A = \frac{1.188 + 1.317}{2} = 1.253 \text{ inches}$$

$$Q_{p3} = 1250 \left(1 - \frac{1.253}{9.5} \right) = 1085 \text{ cfs}, \text{ say } 1,100 \text{ cfs}$$

$$\text{TEST FLOOD INFLOW} = 1250 \text{ cfs}$$

$$\text{ROUTED TEST FLOOD OUTFLOW} = 1100 \text{ cfs}$$

$$\text{TEST FLOOD ELEVATION} = 126.30$$

TAILWATER ANALYSIS

The spillway discharge channel is 18'W x 7'H at toe of spillway converging to 11.5'W x 7'H just d/s of Elm St. From there, the channel widens into a natural brook.

$$\text{Control Section: } 11.5'W \times 7'H, n = 0.013, S = 0.025$$

$$Q_{\text{max}} = \frac{1.49}{.013} (11.5 \times 7) \left(\frac{11.5 \times 7}{11.5 + 14} \right)^{2/3} (0.025)^{1/2} = 3,140 \text{ cfs}$$

At 3-ft depth,

$$Q_3 = \frac{1.49}{.013} (11.5 \times 3) \left(\frac{11.5 \times 3}{11.5 + 6} \right)^{2/3} (0.025)^{1/2} = 983 \text{ cfs}$$

\therefore at 1100 cfs, Tailwater \approx Elev. 106.0

OUTLET WORKS

Reservoir Drain consists of 36" RCP, 690 ft. long with a submerged inlet and a free discharge outlet with hardwall at invert elev. 96.17. There are two 30° bends in the line.

Estimate outlet works capacity with pond at spillway crest elev. 121.0

$$\text{EGL @ Inlet} = 121.0$$

$$\text{EGL @ Outlet} = 96.2 + 3.0 = 99.2$$

$$\text{Assume: Entrance loss} = 0.25 V^2/2g$$

$$\text{Exit loss} = 1.0 V^2/2g$$

$$2 \cdot 30^\circ \text{ bends loss} = 0.3 V^2/2g$$

$$\Sigma \text{ losses} = 1.55 V^2/2g$$

$$\text{assume velocity} = 18 \text{ fps} \therefore h_L = 1.55 \times (18)^2 / 64.4 = 7.8'$$

$$\text{then Slope of EGL} = (121.0 - 99.2 - 7.8) / 690' = 0.0203$$

$$V = 1.318 C R^{0.63} S^{0.54}$$

$$\text{where } C = 130$$

$$R = A/P = \frac{\pi (3)^2}{4} / \pi (3) = 0.75$$

$$S = 0.0203$$

$$V = (1.318)(130)(0.75)^{0.63}(0.0203)^{0.54} = 17.43 \text{ fps}$$

$$Q = AV = (17.43)(\pi R^2 \cdot \pi 1.5^2 \cdot 7.07) = 123 \text{ cfs}$$

$$\therefore \text{Outlet works capacity @ spillway crest} = 120 \text{ cfs}$$

CLIENT CORPS OF ENGINEERS
PROJECT DAM INSPE
DETAIL MUDDY COVE

JOB NO. 580-6-RT-13
DATE CHECKED 10-16-79
CHECKED BY Joe H.

PAGE 6
DATE 10-4-79
COMPUTED BY JED

DAM FAILURE ANALYSIS

Dam Height = 27 ft.
Crest Length at mid-height = 520' (scaled from Sht. 6 of Rec'd Dr'wgs)

$$Q_p = 0.47 W_b T_g Y_o^{3/2}$$

$$= 0.47 (520 \times 0.4) (92.2)^{1/2} (27)^{3/2} = 49,000 \text{ cfs}$$

Downstream of the dam, Muddy Cove Brook traverses a flat flood plain where ICI Americas Inc. Chemical manufacturing facilities are located. The d/s channel meanders thru the complex where two small holding ponds, two foot bridges, and two vehicle bridges are located. The natural channel is trapezoidal with a 40' wide base and 5' high banks. Downstream of the man'f. complex El. 138 crosses the channel. The bridge opening beneath El. 138 is 20' wide and 7' high. Approx. 50' d/s of El. 138 and about 2,300 ft. d/s of Muddy Cove Pond Dam there is a R.R. embankment with a 13' high by 15' wide arch culvert which would pond the dam failure outflow and produce significant flooding of the man'f. complex.

The storage capacity between the dam and the R.R. embankment ~ Reservoir storage. Therefore assume failure outflow at R.R. emb. is 25% of Q_p , or $0.25 \times 49,000 = 12,250$ cfs.

$$\text{Culvert } Q_c = CA (2gh)^{1/2} ; C = 0.8, A = \pi (7.5)^2 / 4 + 5.5 \times 15 = 171 \text{ ft}^2$$

with water at top of embankment,
 $Q_c = (0.8)(171)(64.4 \times 12.5)^{1/2} = 3,900 \text{ cfs}$

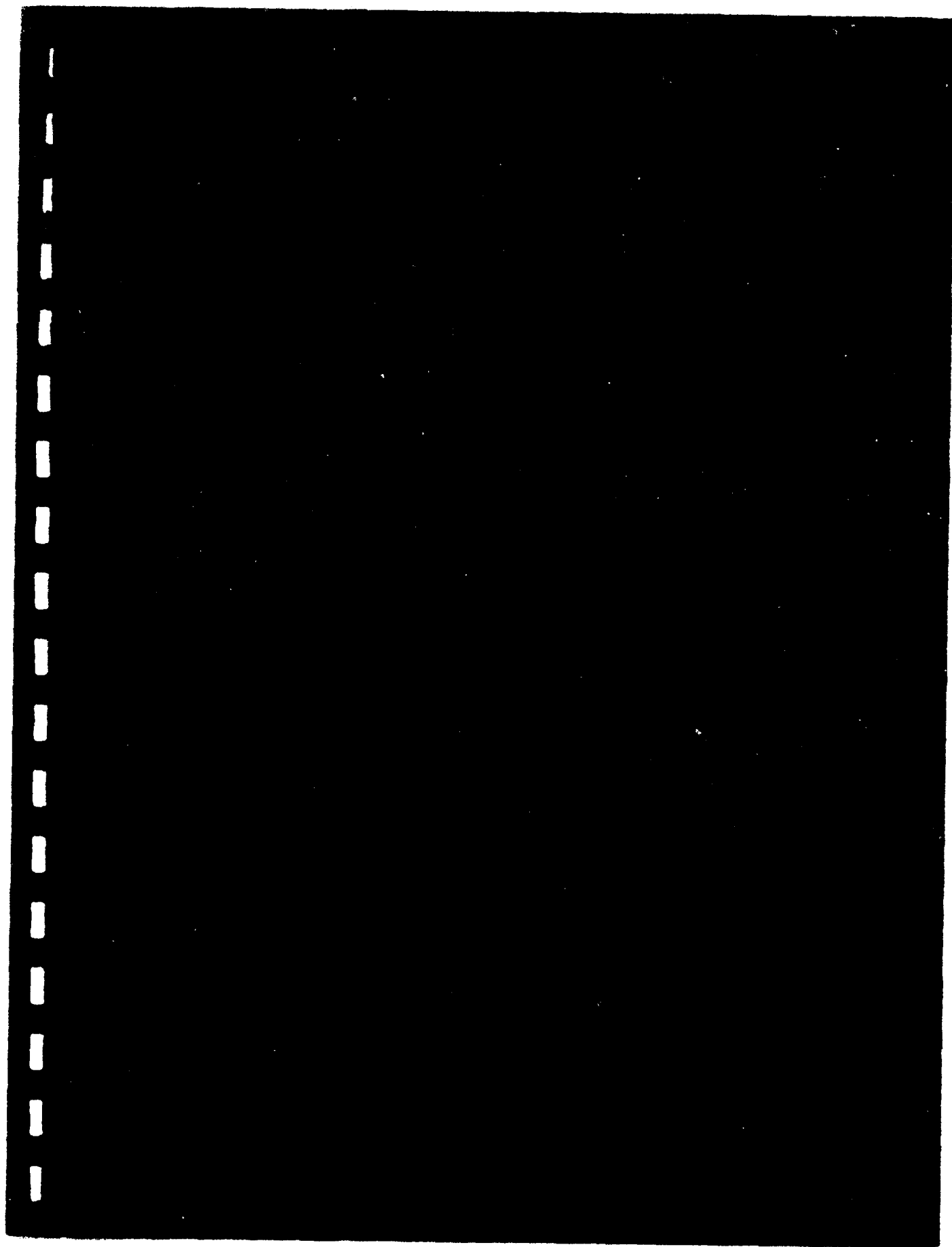
$$\text{Wier } Q_w = CLH^{3/2} \text{ where } C = 2.6, L \approx 1000 \text{ ft.}$$

$$\text{at } Q \ 12,250 - 3,900 = 8,350 \text{ cfs, } H = \left(\frac{8,350}{2.6 \times 1000} \right)^{2/3} = 2.2 \text{ ft.}$$

Estimated top of R.R. emb. (from USGS) is El. 19.0

then approx. W.S.El. thru man'f complex is Elev 21.2 or about 10 ft. deep. El. 138 will be overtopped by about 12' of water. Potential loss of life to employees of ICI is very large.

f. Hazard Classification "HIGH"



LMED
-8